What's in This Issue

Stamping auto bodies from continuous mill sheets is no cinch. Unblemished bodies depend on **correct selection of stock** and careful handling. Read how Budd does the job on page 1041. There are plenty of pictures with the story.

Practical ideas for the maintenance man, and for the production shop man too, are on page 1062, along with line drawings **to give the details.** "Ideas From Practical Men" is one of the most popular features of every issue of *American Machinist.*

Do you have to make furnace calculations? If so, do you know the **thermal capacity of metals** and of fire brick? You don't have to go farther than page 1061 to get all the dope.

"**South of the Rio Grande**" sounds intriguing unless you happen to be the kind of guy who likes to sit around the house rather than see the world. Fred Colvin, who needs no introduction to readers, is back from Mexico with some interesting observations on that country's metal-working industry. Turn to page 1045 for his comments.

Lots of job shop men read *American Machinist.* They realize the need at times for improvised methods for **getting parts out on time** when handling unusual orders. H. L. Wheeler gives you plenty to think about and to look at in his article on job shop methods. You'd better read it on page 1053.

"The house which produces welding" is a title which might be applied to Lukenweld, Inc. In fact, it the only plant **devoted entirely to production of weldings.** How it is set up and how it turns out welded material are described, with numerous photographs, on page 1057.

What can industry do to give **local citizens a better idea** of what it is, how it functions and what it means to the community? Peoria, Ill., has devised a program which gives the answer to that question. It is a program which industry in any city can carry out to advantage. Details of the program are on page 1055.

The three most important parts of a radial drill are the column, arm and head. **How they are machined** at Cincinnati Bickford is told by R. N. Piper. Good pictures accompany the article. Turn to page 1050 for the account.

Punch and die functions are often so intermingled that the designer must proceed carefully to provide **correct sizes and clearances.** This matter is discussed by C. W. Hinman in the ninth of his series of articles on "Press Working of Metals." Turn to page 1048.

Machining of **die castings** requires good fixtures if the job is to be done right. Some useful fixtures are described on page 1046.

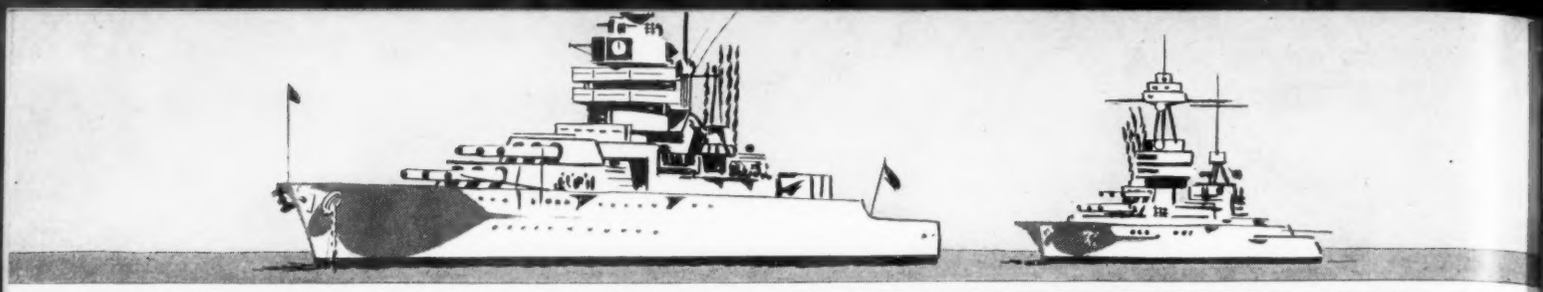
What does the **British trade agreement** mean to the metal-working industry? An analysis of it is on page 1064a.

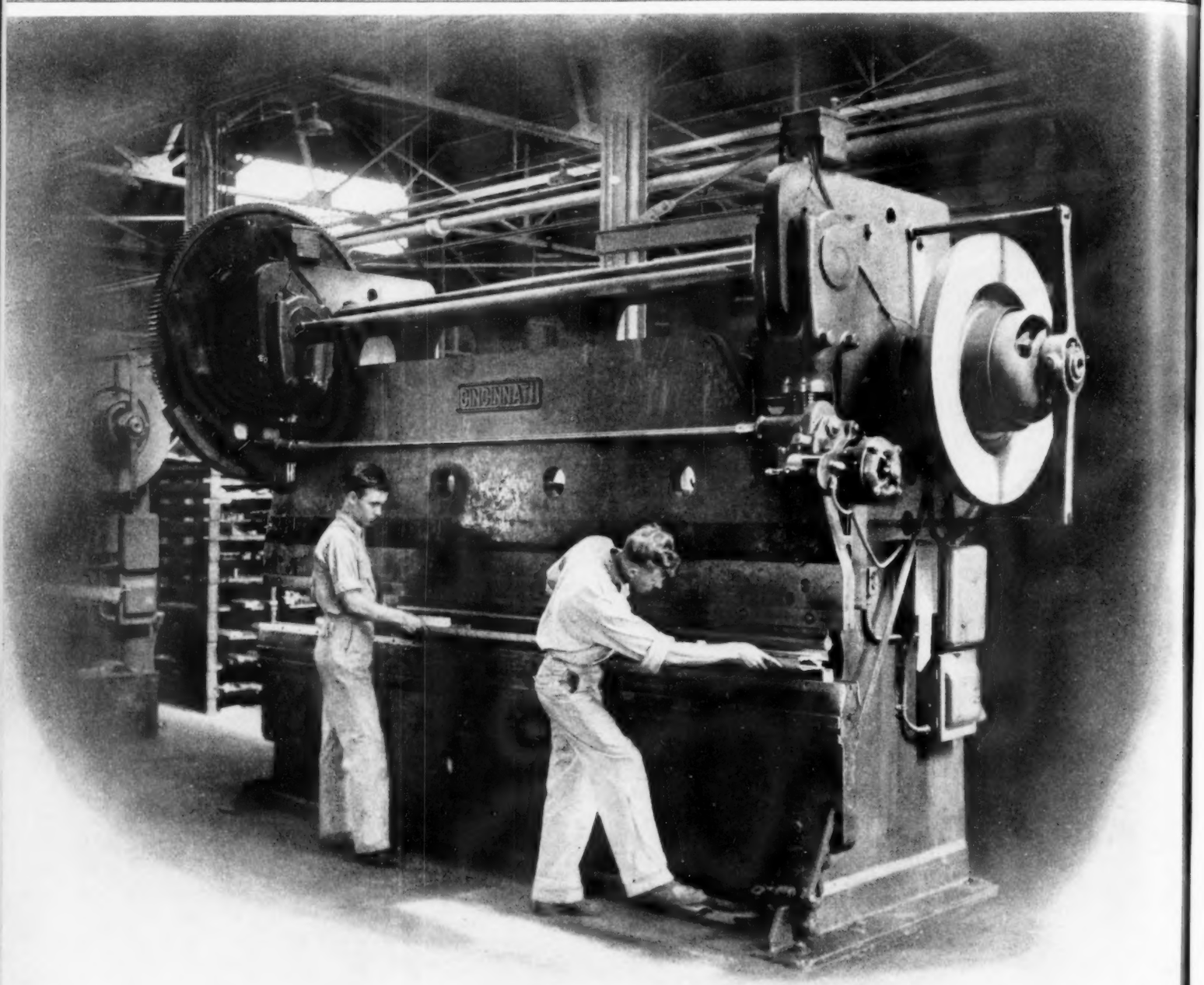
COMING

On October 5 we started something when we published a 12-page special section on the working of stainless steels. We were swamped with requests for reprints and with letters telling how useful the material is proving to be. That was only the first of a series of special sections. The next will be in our December 14 issue. It will tell in understandable language and in convenient form the characteristics, typical applications and common methods of fabricating wrought copper and copper-zinc alloys, usually known as the brasses. The material is assembled so that it will be of maximum usefulness to the shop man.

You can't cut corners in the airplane industry by using inferior materials because of the safety factor involved. You can't get bigger production by reducing standards of workmanship and by increasing dimensional tolerances for the same reason. The problem finally boils down to developing processes which result in mass production without sacrificing quality. That was the sort of situation which faced Curtiss-Wright in building constant-speed propellers. How the company tackled the job and licked it is told in a special article, "Geared to the Skyways," which will be published in our next issue.

It takes careful machining to get airplane parts past Curtis-Wright's inspection.





Cincinnati Press Brakes forming mouldings for deck covers. This machine at Newport News Shipbuilding and Dry Dock Company is one of the many Cincinnati Press Brakes in U. S. Navy and private shipyards. • • • • •

THE CINCINNATI SHAPER COMPANY, CINCINNATI, OHIO

SHEARS • SHEARS • BRAKES

AMERICAN MACHINIST

ESTABLISHED 1877

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BURNHAM FINNEY, Editor

Go West, Young Man!

IN ROBERT SHERWOOD'S fine play, "Abe Lincoln in Illinois," Lincoln says to a friend of his about to start the long trek westward across the plains in a covered wagon, "You are taking the frontier with you." The pioneers literally took the country's frontiers with them hundreds of miles beyond where they had been.

Today these frontiers no longer exist. They have been pushed as far as land reaches in the United States. But in the world of science and industry they probably are no farther along than our physical frontier was in 1860.

That is why we are tired of hearing that opportunities such as our fathers had no longer exist, that every young man who comes out of school today has two strikes called on him before he starts. If we are to believe the cynics, in fact, we should accept the point of view that the slogan of all graduating classes is, "W.P.A., Here We Come."

It's time to pitch out that kind of thinking. Such talk may go if you are willing to subscribe to the idea that the United States is like a group of tired old men sitting in the shade and reminiscing about the good old days, that the country's future is washed up. We, for one, don't take to such stuff.

Evidence all around us disproves that American industry is "finished." To cite only three cases: aircraft is on the verge of an amazing expansion. Television is about to transform the amusement world, bringing into being a new giant industry. People closely associated with the planning of highways and with the direction of safety campaigns are looking ahead to the day when close to forty million automobiles instead of less than thirty millions will be on our highways.

What about the new materials which industrial science has developed? Commercial manufacture of fiber 66, a new elastic yarn which probably will replace silk for hosiery, will soon begin. Wonders are being done with fiber glass commercially. Accomplishments in plastics have opened wide vistas for a new industry. Uses of rubber have been remarkably broadened. The steel industry is winning new markets with new alloys.

You would be astounded if you could see what is being cooked up in industrial laboratories for improvement of known materials and for introduction of new materials—visual proof that though our physical frontiers may have vanished, we still have plenty of opportunity to put the hardy pioneer spirit to work along our scientific frontiers.

ONE DISTINGUISHED industrialist who has spoken on this subject is Charles F. Kettering of General Motors Corporation:

"We have a very unusual condition in this country where we have an excess of materials, excess of money and excess of men. Now, all that that can mean to a primitive mind like mine is that we haven't got any projects. Which means that we are technologically behind and not technologically ahead. If you could get this idea that we know very much about anything out of our minds, and that the whole thing is ahead of us, then I think we would have a shortage of labor in a short time."

America will have plenty of projects which will push its industrial frontiers hundreds of miles beyond their present limits. There will be lots of work to be done. And the young men with vision, alertness and courage will discover to their satisfaction that opportunity still exists, as it always has, for those with the pioneering spirit.

Gaging Business

THOUGH the November election results have given the metal-working industry a mental lift, machinery users have not loosened their tight equipment buying policies. In fact, many machine tool builders say that November's business was below that of October. Little if any improvement is looked for until after the first of the year, partly because of seasonal factors. Chief support of metal-working activities has come from the automobile industry and from the Government's national defense program. Motor car assemblies are near the year's peak, with fourth quarter output estimated at nearly 1,000,000 units.

Federal government awards to metal-working companies amounted to $2,384,501 in the week ended November 19. The steel rate is likely to resist seasonal influences and stay near 60 per cent the remainder of the year. There has been a dab of railroad buying the past week, but in the main it has been disappointing. The shipbuilding industry is straining to rehabilitate and enlarge its facilities as the navy signals full speed ahead for its program. *Business Week's* Index of Business Activity is at 102.5, compared with 98.9 a month ago.

NEW ENGLAND—Machinery and shop equipment purchases will be made in coming months by Bethlehem's Fore River plant which has been awarded a U. S. battleship at cost of $49,815,000. The Springfield Arsenal, Newport Torpedo Station and Portsmouth Navy Yard are buying machine tools. Everett shops of Boston Elevated continue to place machinery orders. Equipment sales to private industries are poor, and inquiries have dropped off. Textile manufacture is up. Important loom shipments to England are beginning.

NEW YORK—Aided by government awards, the metal trades have maintained operations at a good pace. Equipment orders in November, however, were less than in October, but inquiries are promising.

PITTSBURGH—Though the seasonal peak has passed, steel mills expect output to remain close to the 60 per cent level the remainder of the quarter, bolstered partly by automotive tonnage. L. & N. has bought 17,280 tons of rails, and Illinois Central has ordered 1000 box cars. The N. & W. is in the market for 1500 hopper cars and 600 box cars, but railroad buying in general has been pitifully small. Steel for construction work is in fairly good demand. Machinery orders have been light.

CLEVELAND—Auto parts factories and steel mills are operating better than they did in the final quarter of 1937. Machine tool bookings are off a bit. Shoe manufacture is far ahead of that a year ago.

DETROIT—Automobile makers are buying cutting tools in larger volume. Current orders indicate that large stocks accumulated a year ago are about exhausted. So that tool sales should continue to grow. The supply business is still poor. Though Toledo factories connected with the motor car industry are busy, equipment buying is slack.

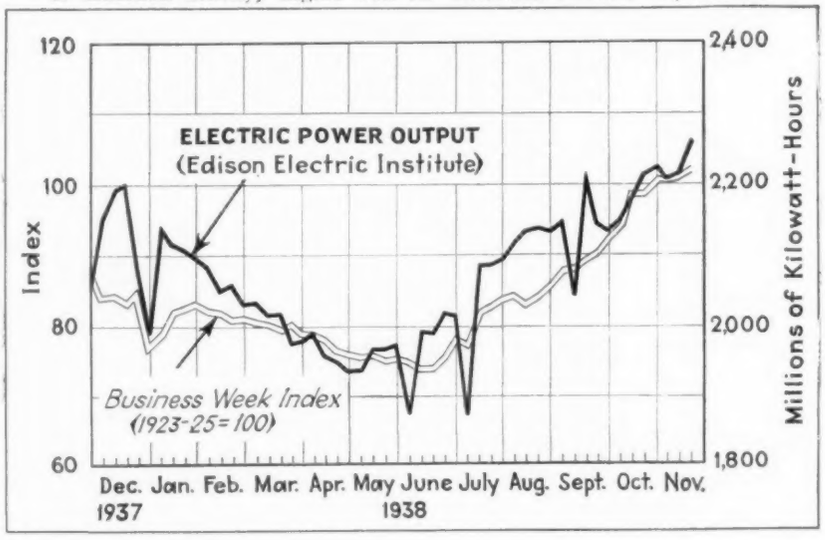
CINCINNATI—Both domestic and foreign orders for machine tools have suffered recently. Domestic sales, however, have declined more than foreign sales. Inquiries, too, have tapered. Employment at Dayton, Ohio, is benefiting from the upturn in activities of General Motors divisions.

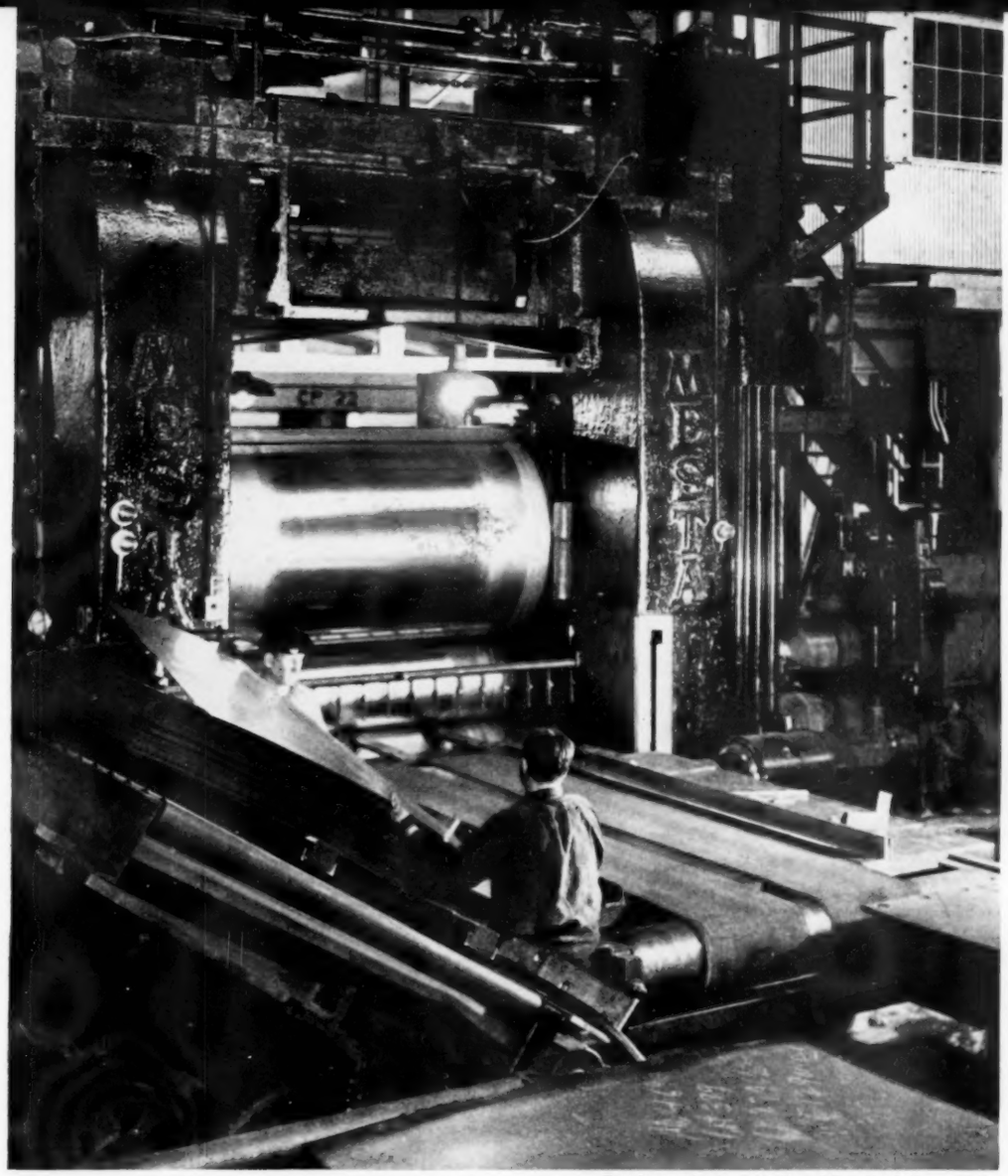
CHICAGO—Automotive and farm equipment tonnage should keep steel production around 55–60 per cent this quarter. Usual year-end tapering in machine tool orders is reported, but the volume and character of inquiries are indicative of active buying early next year. Fansteel has raised pay of foremen, engineers and office workers 10 per cent. Four-wheel drive is going strong. Settlement of the Harnischfeger strike affecting 1100 men is good news for Milwaukee where some companies report incoming business larger in November than in October.

SAN FRANCISCO—The machinery trade has had the first upturn in orders in weeks. Airplane makers are pushing production hard to make a dent in huge backlogs. Building construction continues good. Shipbuilding in western yards creeps nearer as the naval expansion program grows. If these yards should become active, they would need such equipment as punches, shears and cranes. They are fairly well equipped with machine tools. Lumber operations are off, and leaders claim the British Trade Agreement gives Canadian lumber an edge.

ELECTRIC POWER CONSUMPTION VS. GENERAL BUSINESS

The steadily increasing production of electric power (a sensitive barometer of industrial activity) augurs well for continued business improvement





Courtesy of Jones & Laughlin Steel Corporation

Production of steel for the severe drawing requirements encountered in the Budd plant necessitates precision control throughout every step of its manufacture

Stamped Steel for Budd Bodies

Unblemished bodies depend on correct stock selection and careful handling throughout the manufacturing process

STEEL users who have been put at a disadvantage by the new steel pricing system should take comfort from the record of the Edward G. Budd Manufacturing Company. Despite an adverse freight differential, this concern continues to compete successfully with other manufacturers of automobile bodies and stampings.

Budd's Philadelphia plant is hundreds of miles from most of its customers; but its progressive use of modern designs and manufacturing practices has overcome the advantages of suppliers close to automotive centers.

There are a good many angles to the manufacturing philosophy that has maintained Budd's position in the field. Design is one, research another, advanced shop practices a third, but knowledge of steel itself is a basic essential.

Many thousands of tons of steel are consumed each year. This material comes from many sources and frequently requires slight differences in rolling practice or finish to adapt it to a particular job. For this reason the company has maintained close contact with the steel mills through a traveling expert who keeps abreast of steel-mill practice and consults with suppliers concerning special problems.

At the plant, metallurgists see that incoming shipments meet specifications and observe how the steel behaves in the dies. They are in constant consultation with the design engineers and with shop men concerning

Some sheets are delivered unoiled because the customer prefers 100 per cent inspection and oiling in the Budd plant. These men look for rust spots and wipe off any traces of water condensation before the sheets are passed through the oiling rolls

Cold-rolled steel age hardens while in storage, and this condition is a cause of stretcher strains, the bugaboo of the auto body press shop. Budd relieves age hardening by passing all cold-rolled sheet and strip through Budd-McKay break rolls shortly before use. The steel is rapidly bent or whipped back and forth without affecting the flatness of the material. Usually one such treatment is sufficient

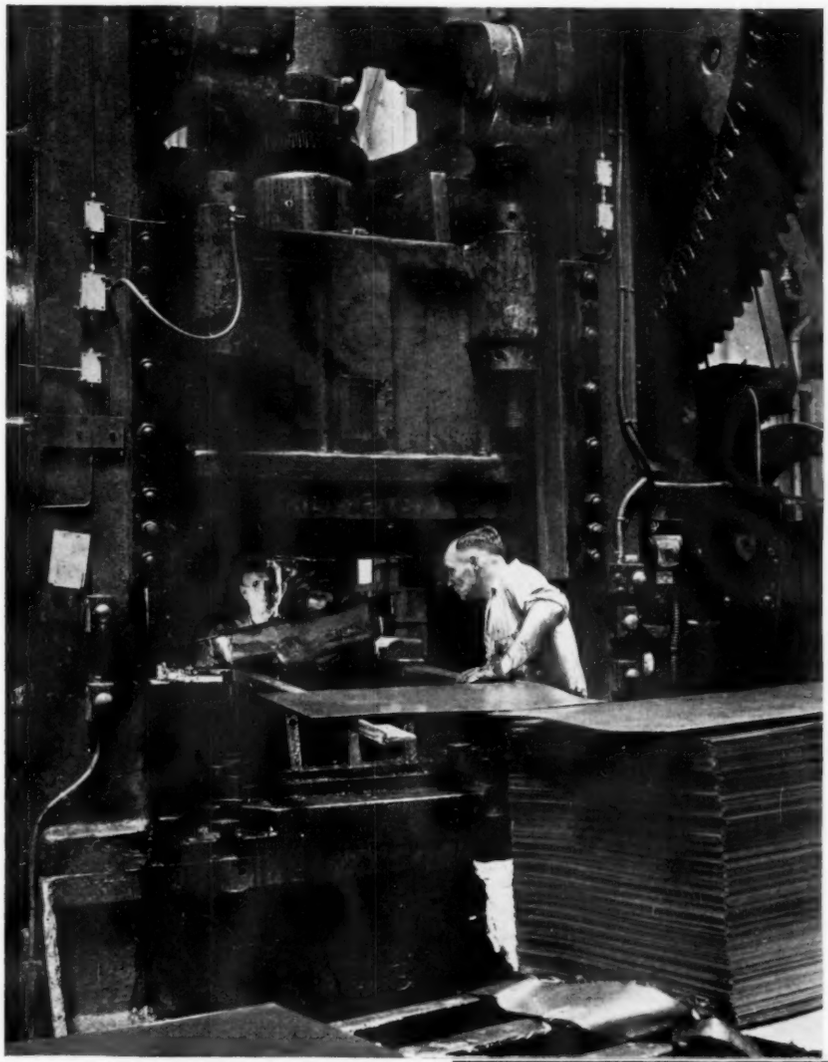
what can be done, what cannot be done and methods of doing the seemingly impossible.A great deal of Budd production involves severe drawing, particularly on body components where finish is important.

Budd has divided its stamping business according to customer or nature of the work, because many contracts run through an entire car-producing season. By segregation of contracts, the shop men and metallurgists are able to give individual attention to a particular body job or assembly of stampings. Other equipment or press lines are available, of course, for smaller contracts. Such is the size of the stamping division, however, that it operates three steel-storage rooms, several press departments and several assembly departments. These are exclusive of the equipment utilized by the railcar division, which is a separate entity.

Half of the steel consumed in the Philadelphia plant is hot-rolled, the other half cold-rolled. External surfaces of automobile bodies must be made of cold-rolled steel because of finish requirements, whereas internal components can be made of the easier-worked hot-rolled material. Finishes in use are: (1) full cold-rolled, (2) hot-rolled, annealed and pickled, (3) deoxidized sheets, and (4) plain hot-rolled. Gages from No. 8 to 16 are usually specified for hot-rolled parts and No. 19 and 20 for cold-rolled parts such as bodies and fenders.

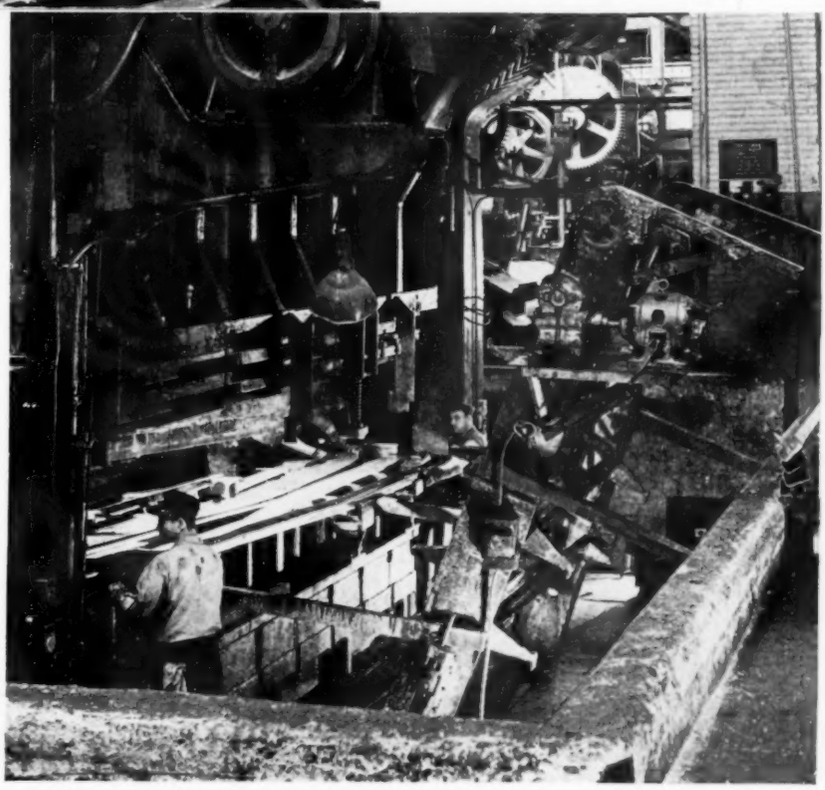
Both sheets and strip, the latter largely the product of the new continuous mills, find their way into Budd stampings. Coiled stock is used for blanking parts, such as rear fenders, where trimming waste would otherwise be excessive. Another economy is the use of blanked out stock for smaller stampings. A good example of this practice is the employment of steel from window openings for making other parts.

With so much steel passing through its plant, Budd requires an efficient system of handling incoming material, not only to check the quantity but to prepare the steel for the stamping departments. Each of the three steel storerooms is served by an inside railroad siding, so that bundles of sheets or coils of strip can be lifted out and transported only a short distance to the weighing scales and inspection department. Sheet bundles are weighed,



Fenders and steel tops are not the only tough deep-drawing jobs in the shop. Oil pans are drawn from hot-rolled steel on a Toledo 500 ton press. One man feeds the blanks in from the front and another man removes the stamping from the rear of the press. Built-up dies are used for all such deep-drawn work in conformity with modern body shop practice

Sheet steel is taken by crane to a battery of four huge Clearing presses installed in a pit. Here the strips are blanked, edge bent for the kick-up in the truck frame, and drawn to channel form. Two gangs work the draw press, which is set up with two sets of dies for producing both the right- and left-hand frame side rails. At the front of the press there is no room to use an elevator for removing finished work. The rails must be stacked in a shop truck and later removed by crane. Rails of opposite hand to those produced at the front of the press are made at the back, as shown, and carried up to the shop floor and the waiting truck by an elevator



then opened and checked for over-all size, gage and number of sheets.

Inspection follows. The degree of inspection varies with the quality of the steel, its use and desires of the customer. Some sheets are 100 per cent inspected for rust spots, pits, scratches and kinks. Sheets received dry are wiped, inspected for rust spots and oiled. They are piled on skids and stacked until needed.

When steel leaves the storeroom, it goes to the square shear department, if cutting into smaller sizes is required. In addition, all cold-rolled material must be break rolled to remove stretcher strains or "worms." In this process it is passed through Budd-McKay break rolls that whip the sheet or coil stock back and forth and relieve the age-hardening

Special racks within the newer automobile cars are arranged to hold the components of numerous truck cabs. Clamps and braces prevent the parts from shifting during transit, and the stampings are delivered in the same condition as when they passed Budd inspection

effect. After standing for some weeks, the hardness of cold-rolled steel can jump from Rockwell B45 to B54.

When age-hardened steel is drawn, stretcher strains appear in the highly stressed portions. These stretcher strains reveal themselves as various "orange peel" patterns in the surface. Once in the metal they cannot be removed, and they cannot be covered up by the new synthetic enamels. So the part is no good to the car manufacturer, and the shop loses.

Stretcher strains are a bugaboo to a stamping shop like Budd's and to the steel mills. A great deal of research is constantly going on to prevent them by improved steel-mill practice, and Budd's metallurgists and shop men are working on the problem as well. Sometimes the die setter is able to overcome them, because of peculiar skill developed in 20 years of setting and dressing drawing dies. Or the shop trouble shooter may know the answer. If not the problem is looked over by the tool engineers, the metallurgist or the mill's expert.

No hard and fast rules have been developed on why stretcher strains occur or on how to avoid them, but they are overcome every day. Progress is being made, for witness the deep-drawn fenders that are now being produced with low scrap loss, whereas only a few years ago such stampings would have been called impossible. Thus, by close attention to the properties of steel and its economical fabrication, Budd is able to load many freight cars each day with unblemished stampings.

LIGHT WORK HELPS MANY HANDS

Glass House—An excellent example of the use of glass brick may be seen in the new assembly shop of the Frederick H. Hart Company. The walls are of ordinary brick to a height of about 42 in. with glass brick above and a swinging window in each panel. Combined with a saw -tooth roof this construction gives good light distribution

South of the Rio Grande

Mexico's metal-working industry is made up largely of small shops contrasting with a few large units which surprise by their modernity

FRED H. COLVIN
Editor Emeritus, American Machinist

WITH FEW exceptions there are no large machine shops south of the Rio Grande. The same is true of any country in which agriculture has been predominant over a long period. Many sections of the United States come under this heading. For machine manufacture, or even large-scale repair work, is not as common as we are likely to imagine. I have visited many parts of the United States where shops employing a dozen men were rare, and where the small repair shop that handles a wide variety of work with two or three men is the rule. The same is true of Mexico.

Railroad Shops Nationalized

There are, of course, a few notable exceptions such as the large steel works in Monterrey and the manufacturing plant in the outskirts of Mexico City, known as La Consolidada, which are both large and extremely interesting. Then there are the shops of the National Railways of Mexico. The main shop is in the interior at Aguascalientes, and there are several smaller shops, such as the ones at Monterrey and Nonoalco. As the railways are now nationally owned and are operated by officials selected by the Railway Union, these shops are of special interest. While the exceptions are noteworthy and will be given due consideration later, some of the more typical small shops will be mentioned first.

These small shops, usually tucked away in a single room of what was originally a dwelling that has been built for many years, are often models of neatness. The conventional lathe, drill, shaper and grinding wheel for tools constitute their main machine assets. In addition, there is usually an oxyacetylene welding outfit and at times a portable arc welder. But such shops do any kind of work that comes along, for many of the Mexicans are excellent mechanics, as is true in many countries. Many of these small shops were, incidentally, larger than the one our old contributor, Walter Gribben, had in Brooklyn, where he did work that was noteworthy in its day.

Repair shops probably play an even larger part in such a country as Mexico than where industrialism is much farther advanced. Machines of all kinds must be kept running, and spare parts are not easy to get from the makers of the machines in use. Consequently machines are repaired beyond what might be the economical point in the United States, but which is perfectly justified in these cases. The age or condition at which a machine should be discarded varies widely with the kind of work it must do and the economic conditions of the shop in which it is used. Keeping tthe working force together by utilizing it to repair its own equipment, much work is justified that could not be tolerated under other conditions.

Crowded Quarters Common

Many of the small shops are devoted to automobile repairs and are frequently equipped with Van Norman cylinder reboring machines and valve grinders of either the Van Norman or Van Dorn variety. Piston turning and grinding machines are also in evidence, and crankshafts are sometimes ground in machines that are more or less improvised for the purpose. I saw Model T cylinder blocks being rebored and rebabbitted for the crankshaft, as was common in the old days, in shops not over 10 x 20-ft. in area. As these are usually in what was the front room of an old dwelling, tiling of various designs can be found on the walls and floors as in Cuba.

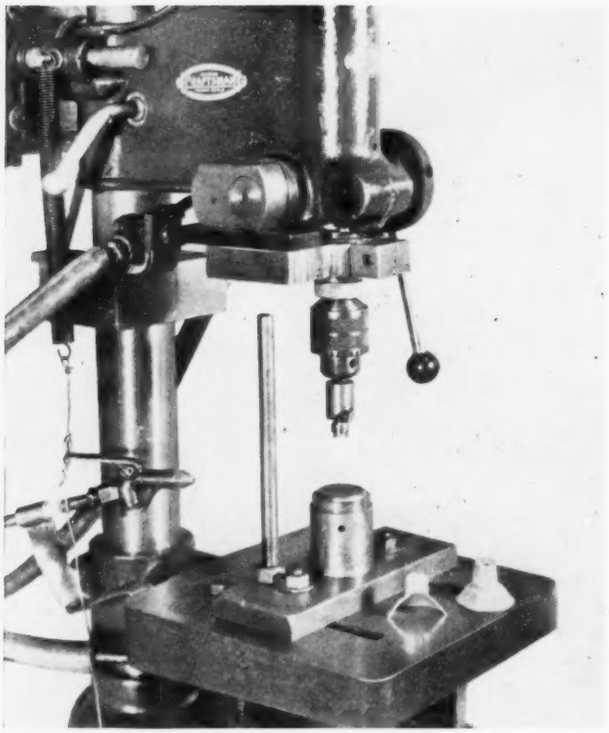
Tinsmith shops, battery repairs, the rewinding of motor armatures and fields, renovating and renting bicycles, electrical supplies and a host of other small industries exist and perhaps thrive, in these small quarters.

And, as in all countries that it has been my privilege to visit, the oxyacetylene cutting and welding outfit has a prominent place and is perhaps used as frequently as any of the other equipment. Some of the small shops are engaged in making jewelry of various kinds and it is extremely interesting to see the attractive pieces that are turned out by hand and with a minimum of equipment.

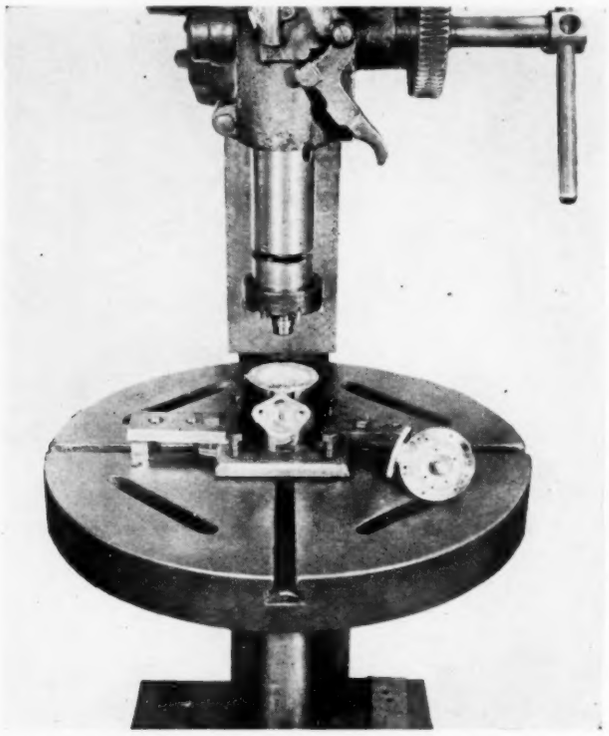
Modern Furniture Factory

In contrast with these is such a factory as that of Ing. Luis Robles Gil who makes modern office furniture and similar articles by modern methods. His products include filing cabinets, clothes lockers, office desks, hospital equipment, window sash, and other similar manufactures of sheet metal. The sheets are formed on modern brakes and presses and are either spot or seam welded, or both, as seems best for the purpose.

Then there are the repair shops of the City Tramway which employs about 800 men and handles the repairs for all the street railway cars in Mexico City. More surprising still is the huge plant of La Consolidada on the outskirts of the city which employs about 1,100 men and has some 37,000 items of manufacture. This includes 27,000 sizes of bolts and nuts and an astonishing variety of other manufactures. These, however, will be treated in more detail in future articles together with some of the work done in the shops of the National Railway of Mexico previously mentioned.



Between the rim and the neck of the part shown only ±0.00 in. is allowed. Facing the neck is done with an end mill in the spindle of a drill press. The work-holding fixture is bored and drilled for four small holes used for blowing chips from the fixture when the air valve is automatically tripped. The feed rack has been removed in favor of a cam for precise spindle travel



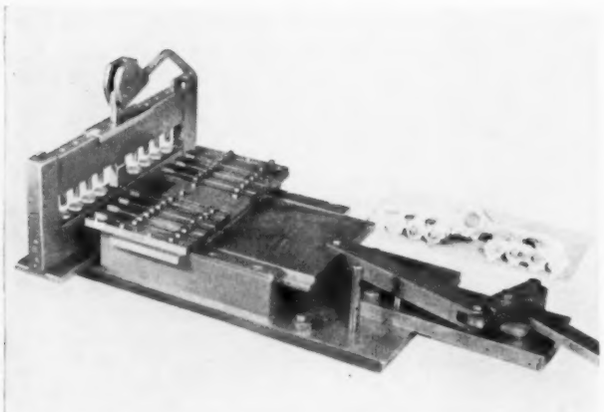
Flange faces are often finished by holding the part against the flat face of a grinding wheel with the hand. Rotary cutters are preferred in some shops as they give a better finish and a more uniform and accurate cut especially if the work is held positively. Here a seven-blade end mill is used to face a flanged casting which is firmly held in the recessed fixture by a central spring plunger. About 0.005 in. of metal is removed from the flange which has a diameter of 3¼ in. and width of ½ in.

Fixtures
FOR DIE CASTINGS

HERBERT CHASE

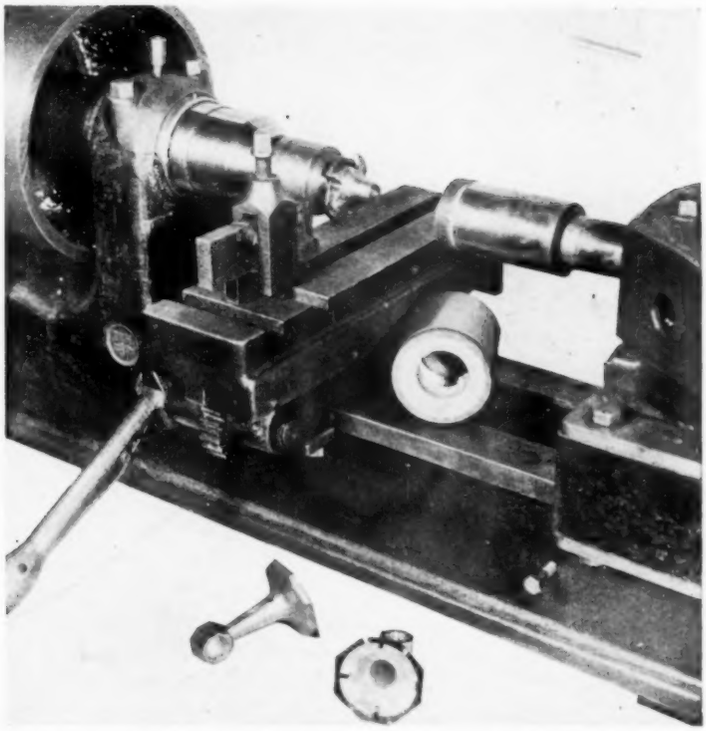
AN ADVANTAGE of die castings is that they can usually be used with little machining. Parts are cast to shape instead of being cut to shape, and with today's technique in die making and casting methods, tolerances are kept remarkably close.

Still there are the fins and flash to be removed where left by die partings and moving die parts. Often this constitutes the only machining necessary. Other parts, however, require drilling, tapping, facing or some other light machine work; and as in machining other materials fixtures are useful in expediting the operations. Here are some examples of the means used for handling die cast parts after they leave the mold and before polishing or plating.

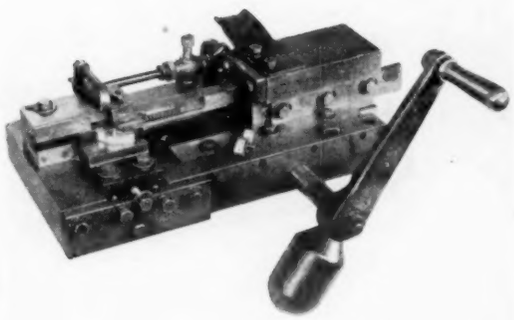


Externally threaded buttons about 1 in. in diameter are cast in groups of eight, as shown, which results in the formation of fins on each side and along the axes of the buttons. These are removed by the eight shaving tools which are advanced on a common slide by the hand toggle while the casting is held in place by the clamp

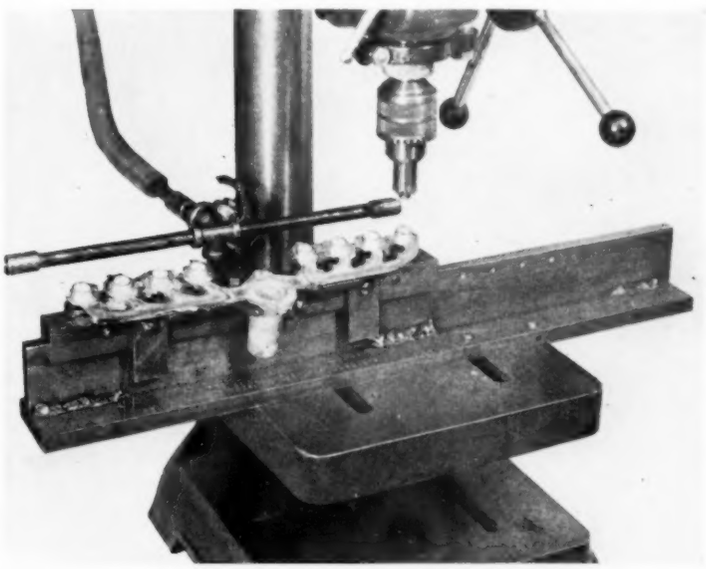
Holes in the three bosses on the casting are drilled and faced simultaneously in this inexpensive set-up. The work, supported by a recessed fixture and kept in place by a spring plunger, is moved up to the drills by a pedal gear and rack which leaves the operator's hands free to insert and remove the castings



Flanges of irregularly shaped castings shown in foreground are faced rapidly, conveniently and without marring in this fixture. The castings are "dropped" into a fiber bushing mounted with a thrust bearing and a hollow arbor on the tailstock of a lathe. When latter is advanced, the piece pilots on an extension of the ratchet-shaped part which rotates with the lathe spindle. The teeth of the rotating ratchet engage ribs inside the casting while a facing tool is fed in on the cross-slide. The fact that the lever through rack and pinion gives quick feed and that spindle stoppage is unnecessary makes for rapid production



One face of a small casting is accurately broached in this fixture. The broach is actuated by the hand crank through a rack and pinion. A cam on the slide trips a valve which admits air through the bent nozzle to blow chips away. Castings are positioned by a pin through a cored hole and a stop against one face of the casting



Ends of the buttons are faced separately as a multiple-spindle arrangement involved undue expense. A gate is held in the fixture which slides to each of the eight indexed positions. A spring plunger in the center of the cutter presses each button into a corresponding recess in the fixture while a cut is being made. Air for blowing out chips is piped to an opening opposite each of the castings

PRESS WORKING OF METALS • NUMBER 9

Clearances for Cutting Dies

Punch and die functions are often so intermingled that the designer must proceed carefully in order to provide correct sizes and clearances

C. W. HINMAN
Tool Engineer
Kobzy Tool & Electric Mfg. Company

CONSIDER the relation between cutting edges of the blanking punch and die shown in Fig. 45. The contour edge of the punch is separated by the exaggerated space *C* from the contour within the die opening. Space *C* is the punch clearance on one side. Side clearance is one-half the over-all clearance. In a round blank, for example, the over-all clearance is the difference between the punch and die diameters. Punch clearance is uniform in width and extends all around between the punch and the die.

The necessity for punch clearance is threefold. It reduces the press exertion necessary for blanking and promotes smooth shearing action. It prevents actual contact between the cutting edges of the punch and die which avoids nicking or breaking them. The ideal clearance produces a blank free of burrs and with fairly smooth edges.

If punch clearance is too small, the usual shearing fractures that extend through the work thickness, between the edges of the punch and die, fail to meet as they should, but pass when shearing through, and a rough-edged blank is the result. If punch clearance is too great, then the tool begins to operate like a drawing die. The work may even resemble a drawing job. There will be large round corners on the die side of the blank, and a heavy burr around the punch. The finished blank appears like a shallow receptacle having thinly drawn sides. A drawing die, in principle, is similar to a blanking die in which the side clearance is equal to the blank thickness and which has suitable drawing radii in place of sharp cutting edges.

The ideal punch clearance depends upon the area and thickness of the blank, its physical properties and resistance to shear. New high-speed presses show that a high production of blanks per minute may, in some instances, require more than usual punch clearances.

The $\frac{1}{4}$-deg. angle shown in Fig. 45 is the die clearance. Die clearance is uniform all around within the die opening. Its object is to clear the edges of blanks as the punch, in descent, pushes them through the die. Dies are usually filed straight about $\frac{3}{16}$ in. deep from the top surface before die clearance begins. When die clearance begins at the die surface, it has the fault of increasing punch clearance and blank sizes each time the surface of the die is re-ground for sharpening. This increase is, however, very small. In a die having $\frac{1}{4}$-deg. clearance, one grinding that reduces the die thickness 0.005 in. increases the over-all blank size only 0.00004 in. But even this small increase becomes 0.004 in. when $\frac{1}{2}$ in. has been ground off.

The clearance angle may be more or less than $\frac{1}{4}$-deg., depending on the nature of the work material, its hardness, thickness and blank area, and whether an increase in the blank size, after grinding the die, is objectionable. Compound blanking dies have no die clearance. It is unnecessary in dies of this kind where the blank is ejected immediately after cutting, instead of being pushed through the die.

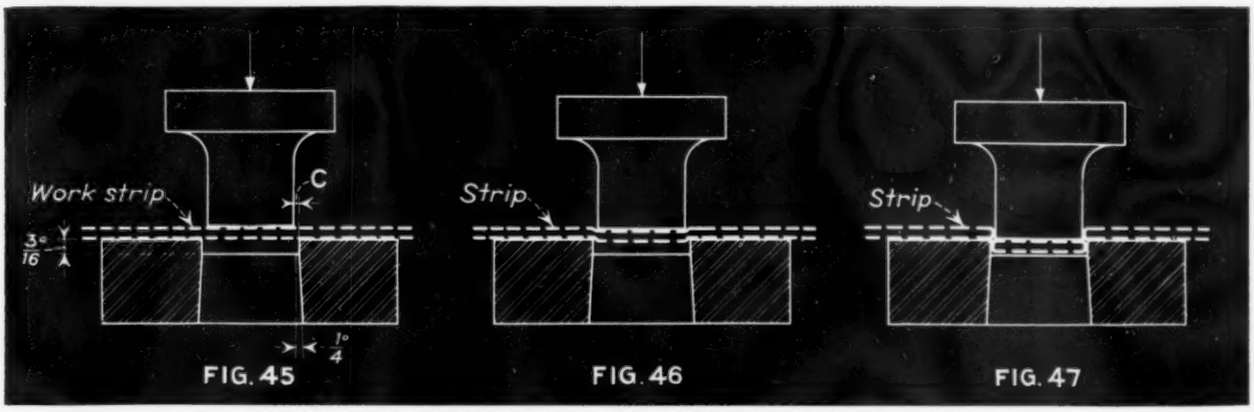
The general rule for over-all punch clearance is based on a percentage of the blank thickness. It is five per cent of the thickness for brass and soft steel; six per cent for medium hard-rolled steel, and seven per cent for hard-rolled steel. If T represents the blank thickness, punch clearances are then $T/20$, $T/16$ and $T/14$. These constants are practically the same as using five, six and seven per cent respectively.

In blanks where a rough edge, out of square, is not objectionable, more than the usual punch clearance is allowed to ease press exertion. A blank for an automobile bumper guard of $\frac{1}{8}$-in. drawing steel may have a side clearance of $\frac{1}{64}$ in., or $\frac{1}{32}$ in. over-all Sheet aluminum, over $\frac{1}{8}$-in. thick, requires more clearance than does brass. It runs from eight to fourteen per cent for $\frac{1}{8}$ to $\frac{1}{2}$ in. thicknesses.

Analysis of the cutting action between the punch and die, Fig. 45 shows two conditions that invariably occur in shearing through a blank. First, the punch, in descent, must sink into the strip sufficiently deep to overcome the shearing resistance of the material, Fig. 46. Second, continuing in descent, the punch breaks the blank through, with more or less loud report, and then pushes the blank into the die, Fig. 47.

The first condition, sinking, is called "penetration"; the second condition, "the break," and combined they are known as "shear." The pressure exerted on the blank by punch penetration naturally produces a bulge or round-edged corner under the blank and within the edge of the die, Fig. 46. It is sometimes necessary that this rounded edge, or the "die side of the blank" be on a specified surface of the blank, and the die is therefore designed accordingly. In practice, however, a small percentage of the sinking process occurs around the die edges; there is a trace of sinking noticeable around the die edges of very hard metal blanks.

The foregoing shearing conditions refer to punches and dies having flat faces and sharp edges. With dulled cutting edges, press exertion is in-



Cutting action of the punch and die is determined by several variables: punch clearance, sharpness of the cutting edges and material. Fig. 45 shows side punch clearance at C; Fig. 46, punch penetration sufficient to overcome the shear strength of the material, and Fig. 47, the "break" through of the blank into the die

creased, burrs are produced around the punch, and increased rounded edges appear on the die side of the blank. The metal, under penetration pressure, "flows" under the worn edge of the punch and up around the sides of the punch, and forms a sharp ridge or burr. This condition is sometimes taken advantage of when needing such blanks.

In large cutting-off and blanking dies for heavy materials, the cutting members are provided with angular shearing faces. This reduces the required shearing pressures by a third for metals over $\frac{1}{4}$ in. thick, and by a half for lesser thicknesses. A die should not be used in a press if there is any danger of the press exertion fracturing either the crankshaft or press frame.

The height of the shearing angle should not exceed the blank thickness, Fig. 48, otherwise the blank may be distorted. In fact, by using either a concave or convex shear on the punch face, blanks so shaped are produced. For cutting ordinary blanks, "shear" is usually ground on the die face, but for piercing large holes, or cutting openings within the blank, the punch carries the shearing face.

There are instances in blanking, however, when a shearing angle on the die face is inconvenient. The shape of the blank, or its position in the tool, and facility in passing through the strip are conditions that often favor making the punch carry the shear. These conditions are more than likely to arise in the design of large blanking dies with long cuts through thick material.

It is evident in Fig. 46 that in the operation of blanking, two important conditions are present relative to sizing. First, punch penetration determines the size of the opening cut through the strip. Second, the die opening determines the cut size of the blank. Therefore, punch clearance is added to the die opening for piercing, but is subtracted from the punch for blanking. In other words: *The punch governs the size of hole, and the die governs the size of the blank.* These are important conditions because they actually determine the cutting dimensions for the punch and die members. For very accurate piercing, the overall-size of the punch is made 0.002 in. larger than the size desired because pierced holes close in 0.002 in. after being stripped from the punch. Piercing punches for materials $\frac{3}{32}$ in. thick and up usually have a slight side relief of about $\frac{1}{16}$ in. taper per foot.

For accurately piercing and blanking a washer of hard-rolled steel $\frac{1}{16}$ in. thick and 1 in. outside diameter, with a $\frac{1}{2}$ in. diameter hole: the overall punch clearance is seven per cent, or $0.007 \times 0.063 = 0.0044$ in. The blanking die opening is therefore 1.000 in. diameter, its punch is 0.9956 in. diameter, while the piercing punch is 0.502 in. diameter, and its die opening is 0.5064 in. diameter.

The blank size is sometimes governed by punch. This condition may occur when the punch has opposite cutting edges on both sides of an arm or protrusion from a blank as shown across the width W in Fig. 49, in which the punch governs the cut size of W. In all such cases, the punch really functions as a die *locally* across the projection W. The width between cutting edges in the punch should be the same as W, and the punch clearance is subtracted from the supporting tongue or projection in the die. This calls attention to the fact that in some cutting dies the punch and die functions are so intermingled that the designer must employ careful thought in order to analyze.

Part 10 of Mr. Hinman's series will appear in an early number.

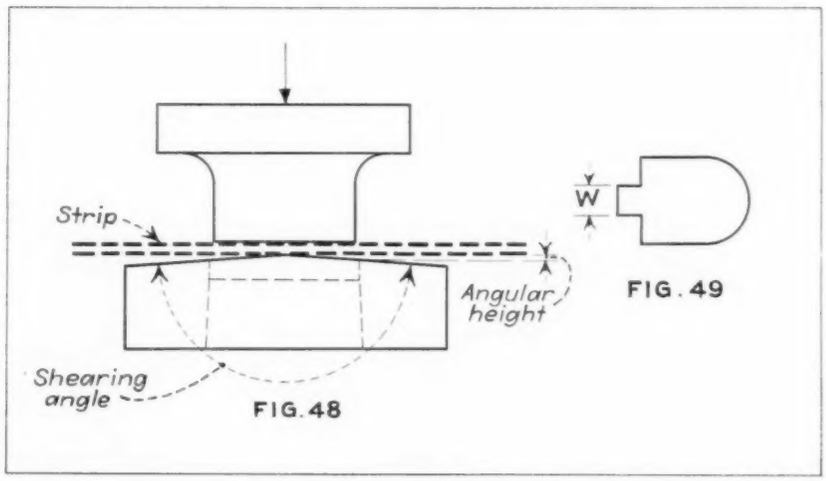
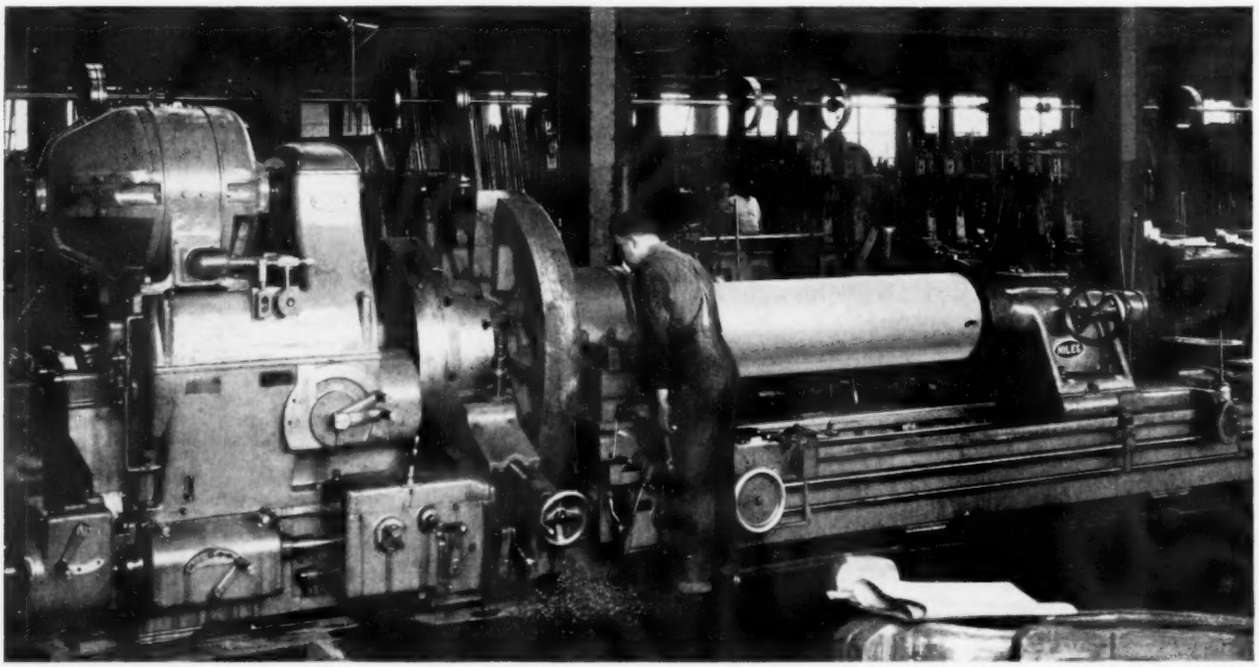


Fig. 48—Power required by large blanking and cutting-off dies is reduced materially by the use of angular shearing faces on either the punch or die. Ordinarily, shear is ground on the die face. Fig. 49—Since the punch governs the cut size of width *W*, the punch really functions at this point as a die, and the width between the cutting edges of the punch should be the same as W. Punch clearance is subtracted from the tongue in the die

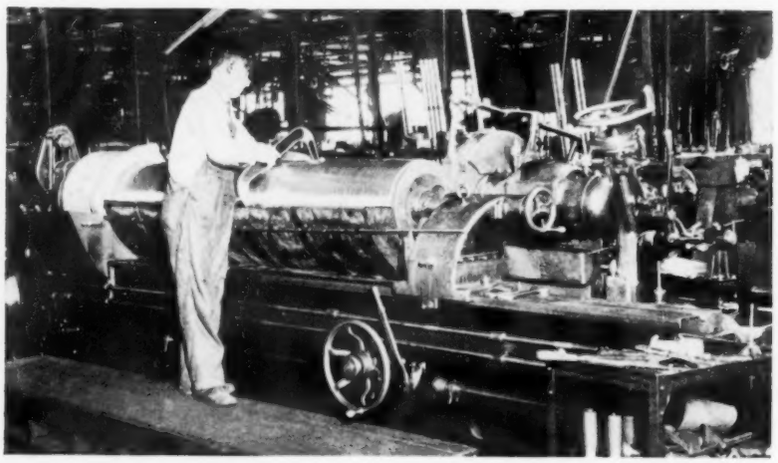
Radial Tooling

R. N. PIPER
The Cincinnati Bickford Tool Company

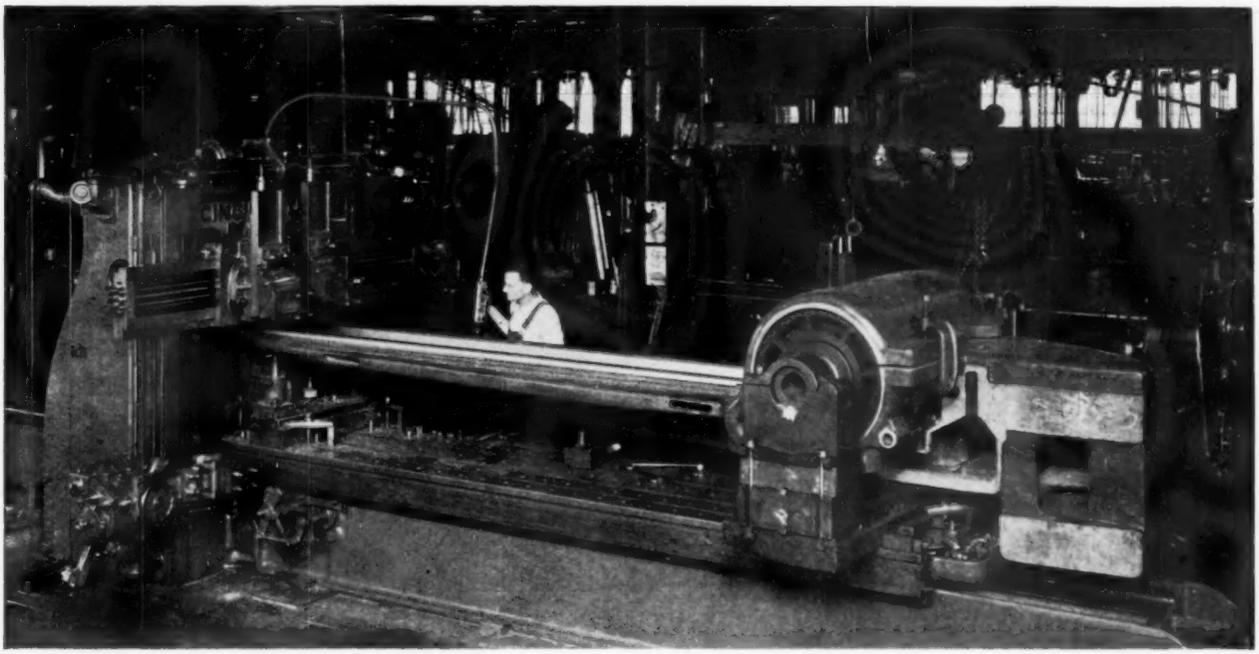
PRODUCTION methods employed in building the "SuperService" radial drill have been developed during 64 years of specialization in the exclusive manufacture of metal drilling machines. Henry Bickford, who in 1874 began in Cincinnati the production of such units, would have thought impossible the degree of accuracy now built into drilling units. Of particular interest to production men are the tools and methods used in machining the three most important parts of a radial drill; these are the column, the arm, and the head.



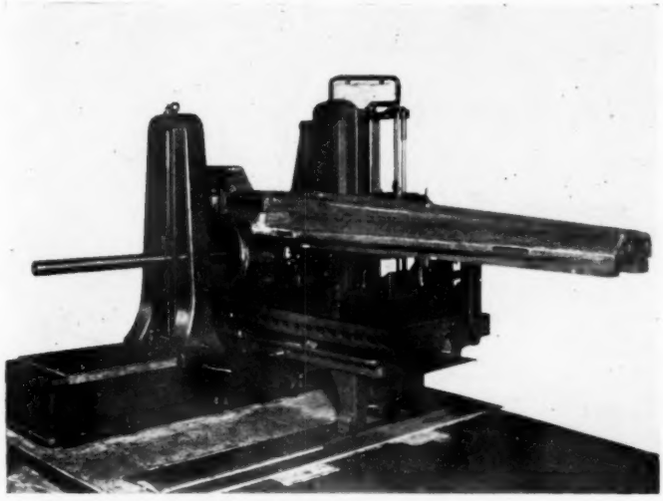
Both the sleeve and trunk are turned and bored on this heavy duty-engine lathe, which swings 42 in. over the shears and 60 in. in the gap. Perpendicularity of the trunk is assured by performing turning and facing operations in the same set-up



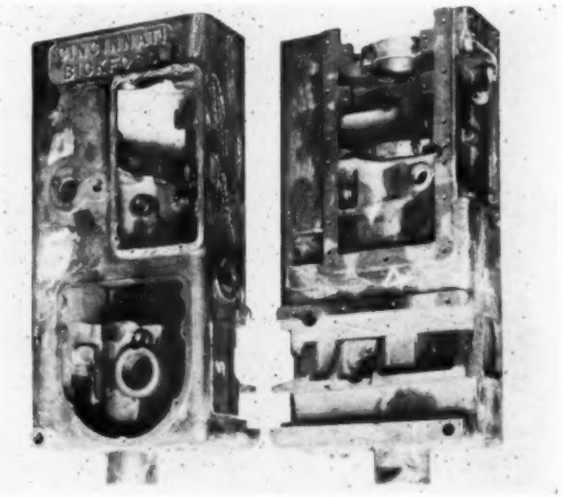
Column sleeves are ground on the outer diameter to within limits of plus or minus 0.0005 in. Plugs are fitted into each end of the sleeve to support it between the centers of the grinder. Work speed for this operation is about 15 ft. per min. in the rough grinding operation the traverse feed is 1 in. per revolution of the work; for finishing this feed is reduced so that, in combination with as light cut, a highly polished finish is obtained



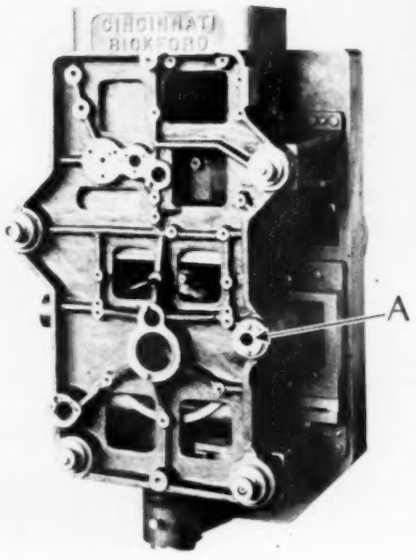
The arm bore is used to locate the arm for the planing operations which follow. Solid supports and careful workmanship insure accurate machining of the ways on this long arm



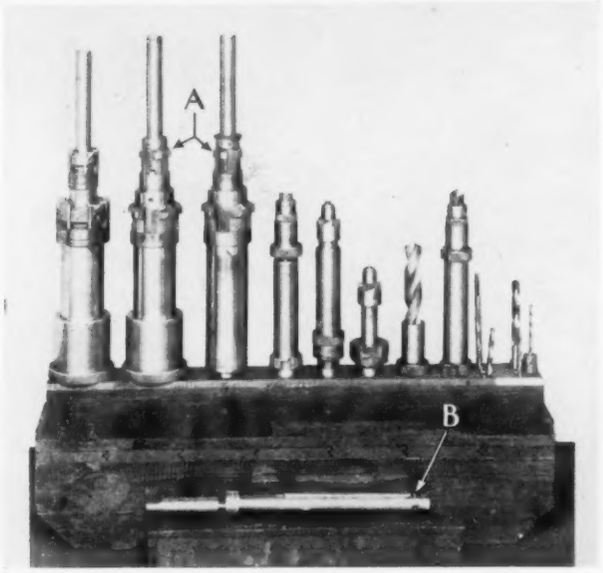
Special support blocks locate the arm casting on the table of the horizontal boring machine for boring the barrel; this is the first operation on this part. The arm shown is for a 10-ft. radial drill with a 26-in. diameter column



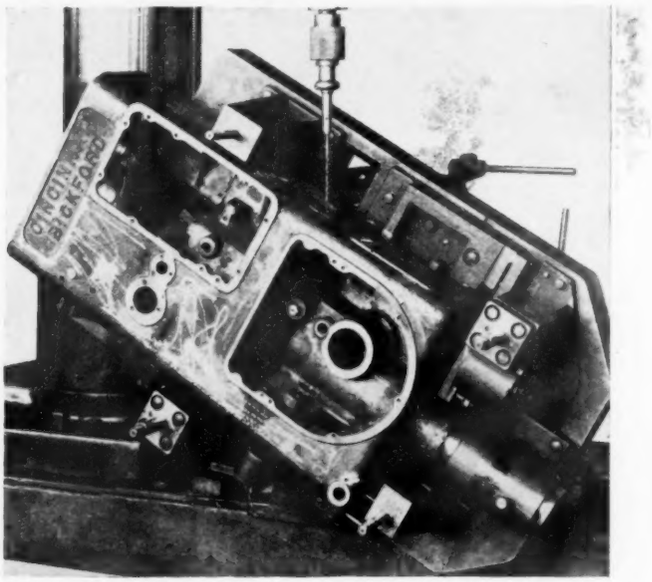
Holes in the front of the head are drilled in this jig set up on a radial drill. The bushing *A* guides a special bar which machines the slot on the flat surface marked with a chalked 5 in the view of the finished head



The head casting, shown here completely machined, is first rough planed on all sides to a size that permits accurate location of the casting in the various jigs. Holes for the spindle bearing caps then are drilled and tapped, and all holes in the back of the casting are drilled in a heavy jig. The bearings caps then are bolted in place and the spindle sleeve bearing is rough and finished bored and reamed in a horizontal boring machine. Other machining operations are located from a plug in the spindle bore and from the arm bearing surface. The 17½-in. long spindle sleeve bearing is honed to a mirror finish in the final operation

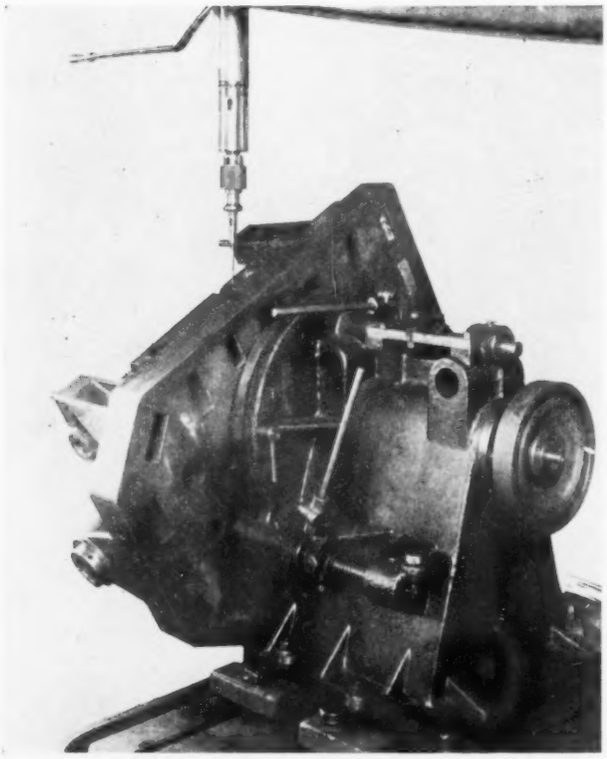


Tools necessary for machining the front of the head casting are kept in this rack. The two boring bars *A* have five-tooth cutters which permit a heavy feed, yet they produce a smooth bore because of the depth of the cutting teeth and the large guide bearings. Tool *B* has a rotary cutter in the end for machining a slot in one side of the casting



Angular oil holes and all holes in the four sides of the head casting are drilled in a jig set on a trunnion fixture. Two indexing plugs are provided in the trunnion for setting the fixture at whatever angles are required. Index holes are fitted with hardened and ground taper bushings into which the hardened index plug is forced into position with a strong spring

RADIAL TOOLING (Continued)



The trunnion fixture is constructed so that it can hold a variety of jigs and fixtures. A counterweight can be attached to the pulley for bringing the unit into an approximate balance when the tool is offset

All tools for a given operation are kept in the tool crib in racks that can be delivered to the machine by lift truck. Each tool position is marked with an aluminum tag fastened to a beveled edge on the rack

Odd Jobs That Tax the Job Shop

Improvised methods for getting work out on time are considered all in a day's work when handling unusual orders

H. L. WHEELER

MACHINISTS accustomed to working in jobbing shops know that no two shops have equal facilities. Wide variations in equipment will frequently force one shop to do a job in an entirely different manner from another. Although the general run of work usually calls for no more than the ordinary methods of procedure, all shops will meet with the occasional job that is different. Often the preparation of makeshift jigs, fixtures and special tools, or the adaptation of some standard machine to a purpose for which it was never intended, provides the only way to do the work in the time available.

One small shop was recently faced with the problem of milling several key seats in a number of long shafts. These keyways spaced at regular intervals along the length of the shaft, had to be accurately in line with one another. The quantity of shafts required justified the construction of the simple fixture shown in Fig. 1. A flanged collar, keyed to the shaft on one of the keyways previously milled, is accurately positioned by a pin engaging a reamed hole in the flange. This pin is mounted in a block which can be clamped at any point along the length of the milling machine table to provide proper spacing of the keyways. In this case, additional holes in the flange of the collar permit indexing the shaft either 90 or 180 deg. if necessary.

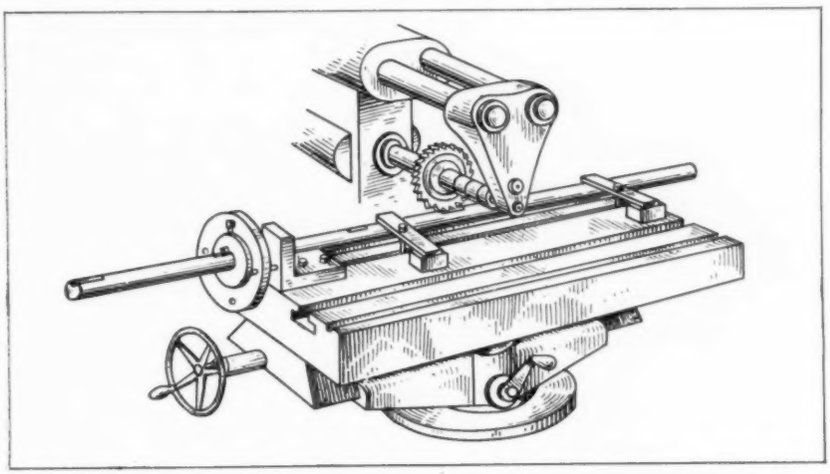


Fig. 1—This simple fixture insures accurate alignment of separate keyways milled in a long shaft

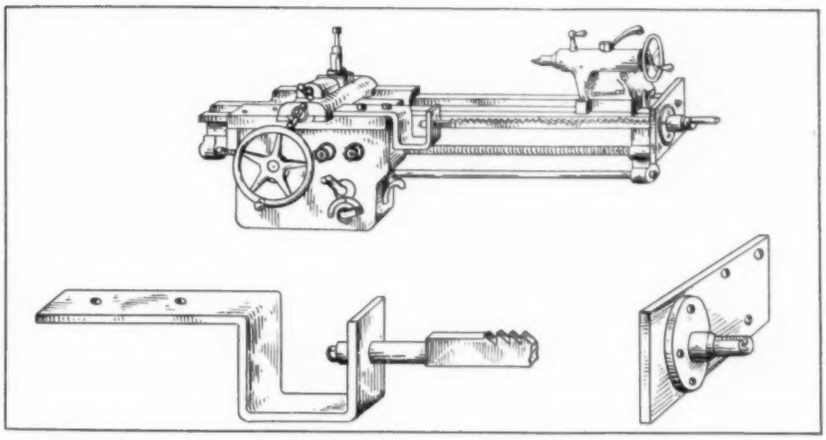


Fig. 2—Two brackets and a set of home-made fixtures enable a heavy-duty lathe to be used for broaching

By the use of an easily made fixture, another shop was able to handle a variety of broaching operations without the expense of a special broaching machine. A large steel plate, bolted to the back end of a heavy duty lathe, extends over the front side of the lathe and supports the various interchangeable broaching fixtures. In line with the broaching fixture a strap steel hoop is bolted to the lathe carriage. This hook is provided with a hole to receive the threaded end of the broach, and pulls the broach through the work when the carriage is advanced toward the head stock with

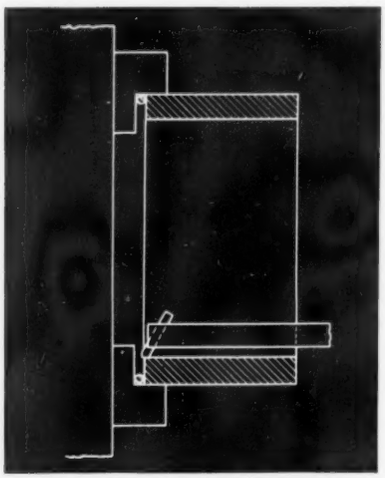


Fig. 3—To provide end clearance when boring heavy castings, a ring of cold rolled steel is used as a spacer. It has several advantages over the usual parallel blocks

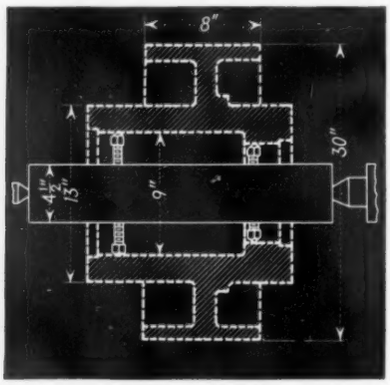


Fig. 6—An arbor equipped with pointed-heat set screws makes it possible to machine the outer diameters and face and counter-bore the ends of an unwieldly casting with only one set-up

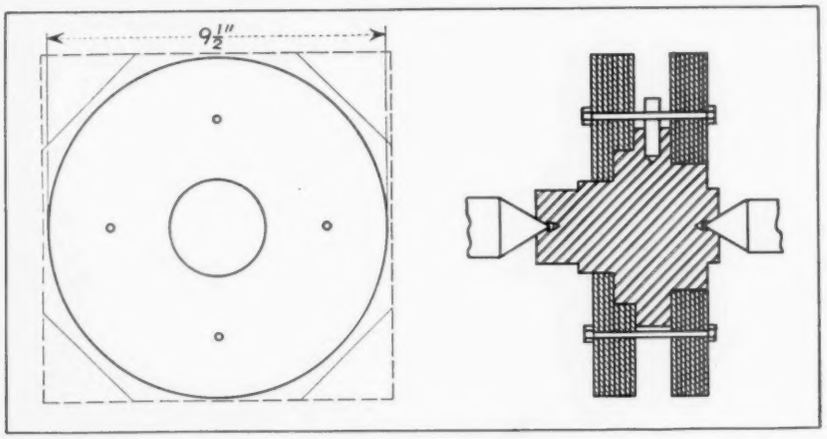


Fig. 4—Turning uniform diameters concentric with the central holes in the plates is child's play with this arbor

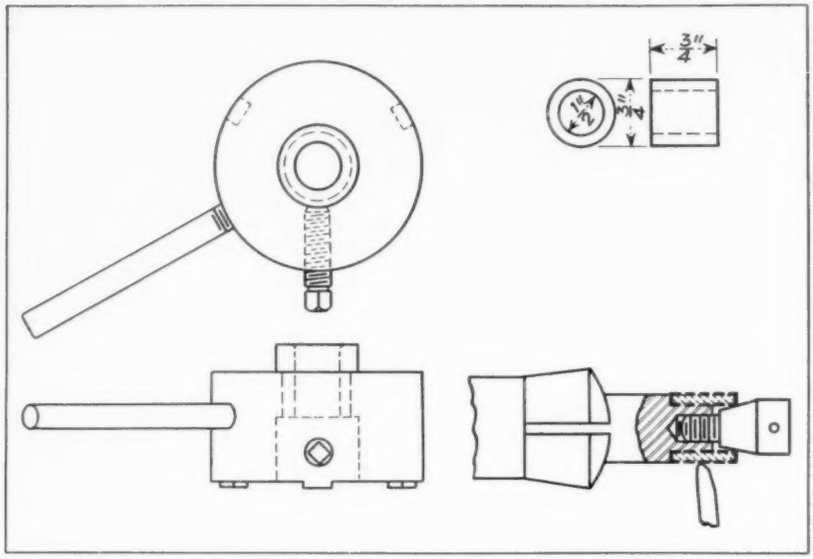


Fig. 5—Tool wear was kept down to a reasonable value by this arbor and drill jig for machining Sumet bronze bushings

the lead screw. This arrangement, shown in Fig. 2, in no way hinders normal use of the lathe.

When boring heavy castings like the one shown in Fig. 3, either in the lathe or boring mill, it is necessary to set the work away from the face plate so that the tool will pass clear through without cutting into the plate. The use of parallel blocks for this purpose has several disadvantages which can be eliminated by the use of steel rings in their place. Rings made of $\frac{3}{8}$- to $\frac{1}{2}$-in. diameter cold rolled steel are suitable for most work of this nature.

An interesting example of a job requiring special treatment is shown in Fig. 4. Among the parts of a special machine to be built in lots of four were sixteen sheet metal disks, made of $\frac{3}{32}$-in. stock. All had the same outside diameter, but were required with three different diameters for the central hole. The material was ordered in 10-in. squares and surplus stock removed from the corners with a power shear. With the blanks held in a four-jawed chuck and backed up with a block of wood, the holes were machined using a trepanning tool for cutting out the center and a boring tool for the finish cut. For turning the outside diameter, a special arbor was made having three steps to accommodate the three bore sizes. With a set of disks assembled on the arbor, the four $\frac{1}{4}$-in. holes are drilled. The disks are then clamped against the arbor flange by bolts through these holes, and are driven by a pin in the arbor which bears against one of the bolts. The outside diameter is then turned to size in the usual manner.

Making the small bushing in Fig. 5 would be a simple job if it were to be made of brass, steel or cast iron. In this case the specifications called for Sumet metal of the toughest grade, which rapidly wears and dulls most tools. A small jobbing shop which had frequent orders for these bushings in lots of about 100 finally adopted the following method. Sumet metal bars about twelve inches long are first rough turned and then cut to length with a power hacksaw. The simple one-piece jig shown in Fig. 5 is used in a two-spindle drill press for drilling and reaming the holes. The parts are then finish turned in a bench lathe, being clamped in a special arbor held in a spring collet.

Another shop saves considerable time by using the special arbor in Fig. 6, since it permits turning the diameter and facing and undercutting the ends of the heavy casting with only one set-up. Ordered in appreciable quantities, this part was so unwieldy that the time spent in making the arbor was justified by the elimination of a difficult set-up.

PUBLIC RELATIONS FOR INDUSTRY

Over the Back Fence

Peoria and suburbs with a population of 121,050 and a local trading area of 210,000 is a metal-working city with a dash of liquor (Hiram Walker). Local industries now see to it that town gossip is based on fact

IN A SMALL TOWN everybody knows everybody else. In a large city, nobody knows his next door neighbor. But, in a city the size of Peoria, Ill., one knows his neighbors, has a considerable circle of acquaintances, and possesses a keen interest in all that goes on in the community. In a city this size, idle gossip can spread so far and so quickly that means of keeping people correctly informed are particularly worthwhile.

Peoria's employment situation is dominated by Caterpillar Tractor Company with its average of 10,000 employees, bulwarked by such metal-working plants as Keystone Steel & Wire, LeTourneau, Altorfer (ABC washer), Avery (manufacturer of farm equipment and tractors), Herschel Manufacturing, Haag Brothers (washing machines), W. A. Laidlaw Wire, and Peoria Malleable. Early last spring Peoria began to lay the groundwork for a long-range program for development of a feeling of mutual good will among the citizens and a better understanding of the problems of the employer.

A committee was organized by the Peoria Association of Commerce under the chairmanship of G. M. Walker, Caterpillar Tractor Company, for the purpose of pushing the "what helps business helps you" campaign. This committee was composed of executives from retail, wholesale and manufacturing companies. It was divided into five subcommittees; program, speakers, essay, publicity and education, and distribution of publicity material. Assistance in routine handling and other details was given by the regular employees of the Association of Commerce.

In general the committee used such publicity material as envelope stuffers, tags in connection with retail sales, stickers for letterheads and special letterheads. In addition, billboards were used as well as canvas signs stretched across the streets at strategic points. While this served as a general background for the entire project, more direct benefits were achieved by other methods.

Speakers gave short talks at meetings of all the various clubs and societies in the city. The speakers first met and discussed the general problem to be attacked. Each of them then based his talk on his own personal problems and explained the public relations program from his own viewpoint. With some 30 or 40 people talking at women's clubs, luncheons, schools, the local college and other groups, the entire campaign was personalized to a much greater extent than signs, stickers and mail pieces could do. Talks and the inclusion of local industry news in broadcasts over the local radio station were a part of the program.

Supplementing the talks given at the various schools was a citywide school essay contest on the general subject of what industry means to the individual and to Peoria. It accomplished the dual purpose of securing the attention of the young people and educating them on the general benefits of industry in their town. Much favorable publicity was secured for the program in local newspapers.

The publicity and education committee had originally planned to

prepare or furnish material for feature stories which could be used in the Sunday magazine section of the local newspapers. It was found that this idea was not satisfactory because much of the material had been covered in previous news stories and would not arouse sufficient interest. For the latter reason paid advertising in local newspapers was not considered a satisfactory means of pointing out to the people the benefits which their local industries provided.

The committee found that the newspapers were receptive to anything which was spot news. The managing editors of both local newspapers who were on the committee pointed out that they could do the most good by having the various industries take advantage of publicity on plant happenings and by giving the press easier access to their officials. This kind of cooperation was found to be more successful in securing favorable newspaper treatment than any other method, including special feature stories about individual companies or by propoganda emanating from the companies.

Information Please

As an example of the informative work done by some of the companies, Keystone Steel & Wire Company issues regular financial statements in which President Sommers discusses the business of the past and sometimes points out possible future prospects. Caterpillar pursues a similar course so that almost at all times factual information is available as to the status of the two leading employers in the community.

Whenever the companies have interesting pictures of visitors, or unusual products which carry news value, the local newspapers have cooperated in publishing such information. All of this adds up to a sizable total of basic facts which the community knows about its industries.

One of the first things discovered in the work of the committee as a whole was the necessity for educating the members of the committee itself on the meaning of public relations. The fact that public relations is not propaganda and is not something that can be bought by the pound but rather is a daily way of living had to be put across.

For this reason the fall season opened with out-of-town speakers as part of an educational program to explain the general subject of "What is Public Relations?" It was believed that having prominent people come in from the outside to deliver such informative talks would make more of an impression and carry more weight than if such educational efforts originated in the local groups.

Certain basic facts have been established in the preliminary work pointing the way to future development in this work:

1. Always let the newspapers know what is going on. By offering them the greatest of cooperation and throwing the doors open for all information, the proper facts can be printed, and gossip and rumor will not have a chance to grow. If the company is truly doing its share in improving both employee and public relations it will find that the newspapers will bend over backwards to help out if proper cooperation is given.

2. Executive and supervisory forces of any organization must give their support to any local committee by providing the necessary information when it is required and by building up news stories for its share in the program.

3. Publication of financial statements has been found to be highly important and very beneficial. It is not always necessary that these be put in so-called "simplified" language.

4. New products, large shipments to new fields, unusual products are all valuable for local publicity. This type of publicity gives the community a personal interest in the institution. At the same time it shows that the plant is on its toes and is taking advantage of every opportunity to spread employment for that community.

5. It is essential that employee relations inside each of the companies themselves must be good. All the newspaper articles and all the speeches in the world will not make up for ill treatment in the plant. In other words, it is impossible to convince anyone that Blank Company is a good company just because it regularly issues its financial statement, has a good selling force which keeps things going by selling to all parts of the world, if this is not backed up by good treatment of the employees in the shop.

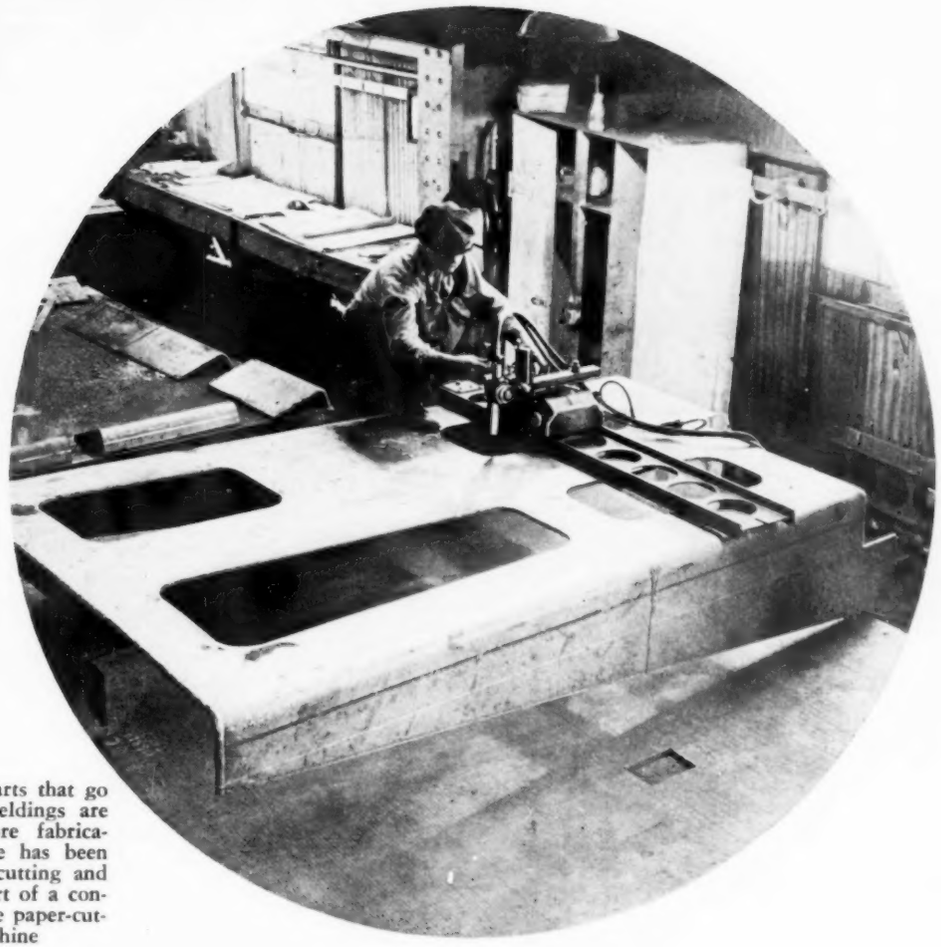
6. Permanent activity in educating everyone connected with local community relations work as to their responsibilities and the opportunities available for increasing good will is essential. The fact that good public relations is a build-up of individual contact must be driven home. Most people fail to think of this in their daily relations and that every contact should be good and friendly whether by phone, information, letter or otherwise. An appreciation that each business in any community is interlocked with all others and that anything derogatory said about one will eventually affect all is necessary.

Keep Plugging

Believing, therefore, that a continued program of self-education and a spirit of cooperation and friendliness with the entire community and the newspapers is necessary the committee in Peoria plans to keep plugging away. It is their belief that, if a community force expressing good will toward local companies can be developed and is expressed over the backyard fence in the daily conversation of the men and women of the community, a long step will have been taken in the direction of mutual understanding of all the problems involved. Agitation will have a tough time getting under way when men are treated right and the community knows it.

Local Publicity Check List

1. Do you furnish local newspapers with news material when you have it? ————
   (How about that new machine? that shipment to Zanzibar? that special design?)
2. Do you help newspapers by offering facilities and assistance on news even if it might be an unfavorable situation? ————
3. Do you issue frequent financial statements? ————
4. Do you occasionally give the newspapers any information or any forecast of business possibilities or lack of possibilities? ————
5. Do you or your employees enter into community activities? ————
6. Do you or your employees have any other outside interests? ————
7. Do you or your employees secure favorable publicity through talks before societies or groups? ————
8. Do you or your employees secure favorable publicity for themselves and their company by writing articles for papers or magazines? ————
9. Do you or your employees enter into industry or national organization activities which are always good for local publicity? ————
10. Do you hold "open house" or have other arrangements for people to become acquainted with your plant and products? ————
11. Do you make use of your local radio facilities? ————



Many of the parts that go to make up weldings are flame cut before fabrication. This plate has been formed before cutting and will become part of a continuous cigarette paper-cutting machine

Welding Only

Plenty of plants use welding extensively as one of the steps in processing their products, but Lukenweld, Inc., is probably the only one devoted exclusively to the production of weldings

ORIGINALLY started as a pilot plant to demonstrate the utility of welded steel construction from the products of the Lukens Steel Company, Lukenweld was first housed in one of the mill buildings of the parent plant. The welding branch of the business soon outgrew these quarters, and it was found necessary to purchase a thirteen acre tract on which buildings were already available in order to set up Lukenweld as a producer in its own right. This move proved a blessing in more ways than one. In addition to providing room for expansion, it gave an opportunity for closer cooperation between the engineering department and the shop than was possible when part of the steel mill; it stimulated this activity as an independent enterprise which has led to numerous contributions to the technique of arc welding.

In its new location Lukenweld was first housed entirely in one building. Early in 1937 operations expanded to three buildings which were modernized and fitted for the purpose. One of these buildings is a combination office building and receiving department. The office is of sound-proof construction and includes the engineering department.

Steel plates are received from the parent company already cut to specification from drawings supplied by Lukenweld. In addition, castings, forgings, stampings and bent shapes often make up part of the incoming material.

In the receiving room, much of the material is handled by an electromagnet carried by a Cleveland Tramrail hoist so arranged with monorail track that it can reach any part of the department. A layout table in this room provides means for inspecting all the material received before it is released to the fabricating shop. There is a rack for steel bars and an Armstrong-Blum automatic cold saw to cut the stock to desired length. Most of the material is plain carbon steel, but low alloy, high tensile steels find frequent use.

The main manufacturing building is about 320 ft. long by 125 ft. wide.

The center bay is served by two 25-ton cranes. Two side bays for lighter work each have a 5-ton crane.

Progressive manufacture is used. As the work enters one end of the building it is assembled and tack welded. Frequently, when the nature of the work permits, subassemblies are built up before the entire structure is put together. If the work is repetitive, jigs are provided. The main welding operations are performed with the assemblies held in universal positioners which have been designed by Lukenweld especially for this use.

Six such positioners are available, each having a capacity of 15,000 lbs. and being able to handle pieces 15 ft. in length. By means of these positioners, assemblies may be held to best advantage for arc welding. Practically all welds are made with the electrodes in a down position using 500 or 750 amp. a.c. welding transformers.

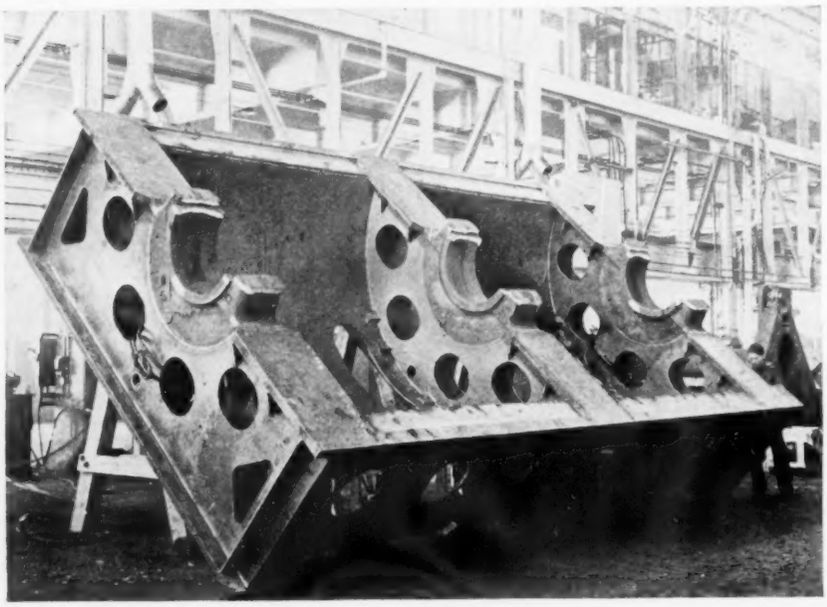
The main building has two balconies. One is used only for the generating electrical equipment. The other is used as a production set-up for E. G. Budd Manufacturing Company's underframes for its stainless steel trains.

The frames are made in three subassemblies. These are first laid out and tack welded on a series of tables separated by screens. From the tables the subassemblies go to six positioners, similar to those installed on the main floor of the building but smaller, lighter and hand operated. These units are also fully universal and in addition have crank arms which are adjustable in length, permitting the operator to balance the work in relation to the pivot bearings. An ordinary Ford brake drum and band at the end of the housing is kept under spring tension and is sufficient to keep the set-up stationary when it is positioned.

The third building serves for stress relieving, straightening, testing and final inspection. A car bottom furnace with an 18 ft. by 6 ft. 9 in. hearth is used for stress relieving. It is fired by propane gas and controlled by a Brown recording potentiometer pyrometer. Welded assemblies are heated to 1100-1200 F. at which temperature they are held from two to six hours depending on the thickness of the section and design of the piece. At the end of this time interval, the door is opened about one foot and the work is allowed to cool to 300-400 F. It is then removed from the furnace and cooled in air. The furnace cycle is arranged to last about 24 hours so a charge can be made daily.

Weldings are sent to the Lukens Steel Company for cleaning by grit blasting. As in the case of the shape cutting of steel plate, this practice is followed to avoid the duplication of equipment. The cleaned assemblies are returned to Lukenweld where they are marked with white paint and set up on one of three layout tables for final inspection.

Two large straightening tables are available for units needing this type of correction. Square holes in these tables provide means for mounting strong-backs for clamping down the work. Pressure is then applied at the proper points by the use of jacks. One of the tables is equipped with two traveling crossrails each of which carries a 30-ton pneumatic jack with a spring pull-back for exerting pressure from above.



An example of clean welded fabrication is this bedplate for a marine diesel engine frame. Large work like this is often positioned for welding by using blocks and a traveling crane. Smaller units are held in universal power positioners

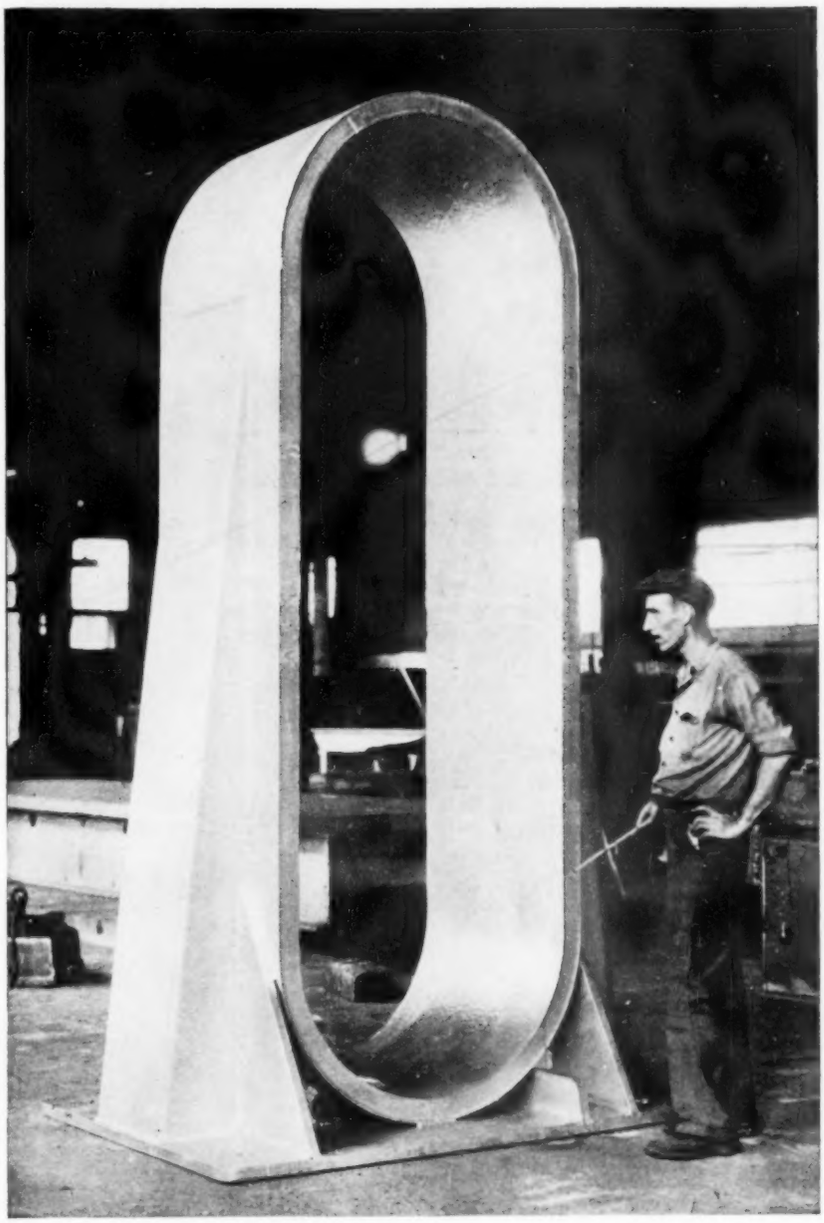
A propane-fired car-bottom furnace does the stress relieving. The parts shown loaded on the hearth are underframes for Budd streamlined railroad trains

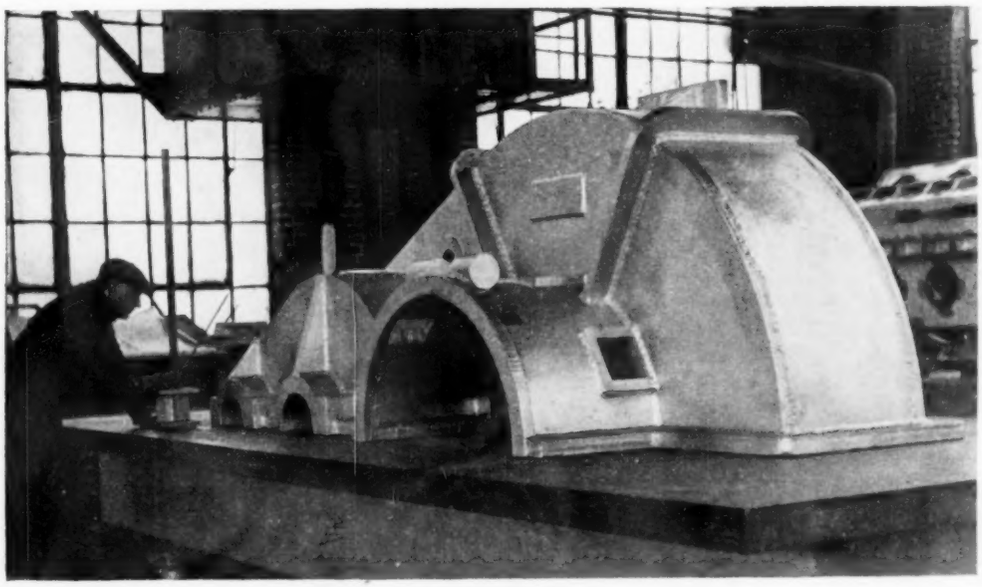
This shop has a 25-ton crane for handling the work. It has two portable Lincoln welding equipments for touching up welds where needed. A hydraulic pressure installation is available for welded units which require a hydrostatic test. Both this shop and the main fabrication building are piped with propane gas which is used for hand torch cutting where trimming or adjustment is needed.

The first principle used by Lukenweld is to divorce the fabrication of welded parts from previous practice used in designing and making castings, stampings or forgings. Sections and contours developed in the manufacture of machine units by the older methods are not followed in the welded structure. On the contrary, some of the chief advantages of welded design are in the simplification of the stresses met in service to obtain a lighter unit with the same or greater strength.

In the early stages of the art, welded units were built up chiefly of plates and structural shapes fused together to conform to the general dimensions of the product desired but with little attention to the new conditions involved. The result was often a crate-like structure which by appearance and performance created an early resistance to the introduction of welded machine units.

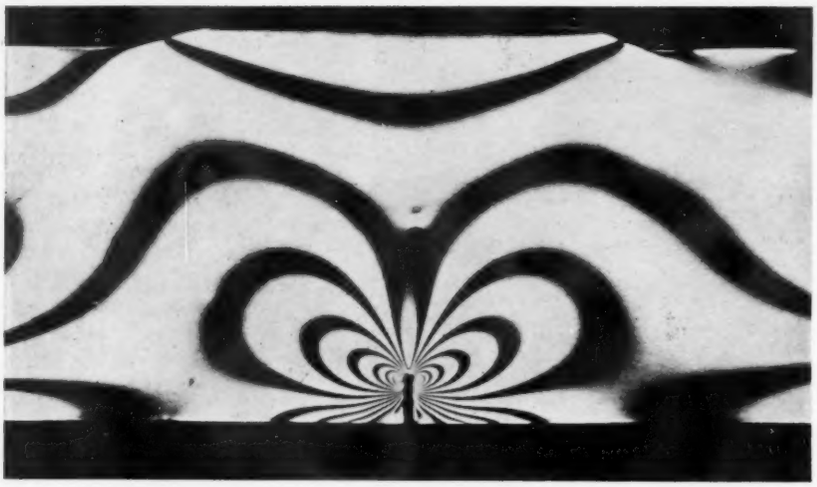
Engineering in this field has now progressed to a point where the novel properties introduced by welding are recognized and utilized. A structural shape is not employed just because it happens to be rolled as a standard product for some other purpose. On the contrary the technique has reached a point where the entire field of steel fabrication—casting, forging, rolling



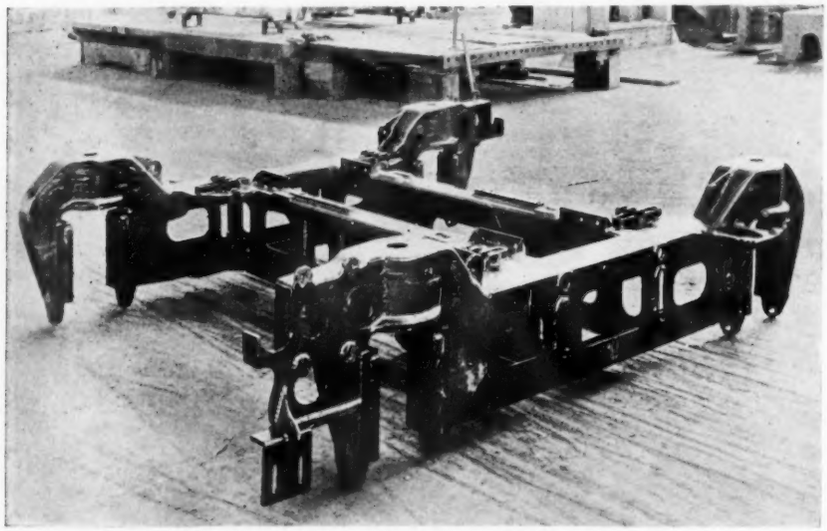


Proper design of weldings departs from precedents set up in other forms of construction. This frame fabricated to a 2,000-ton hydraulic press is a good example. Two 3-in. steel plates are formed to U-shape and butt welded to make the frame

After stress relieving, weldings are carefully lined up on a surface plate and gaged for accuracy. The gear case cover illustrated is typical of the many uses to which welding is put



A photo-elastic study under polarized light shows the stress concentration in a butt weld fused on one side only



A subway car frame for the B.M.T. Lines in New York was fabricated by Lukenweld for the St. Louis Car Company

and stamping—is drawn upon as the raw material for the welded assembly.

Welding engineering goes beyond the design of the piece into the methods employed in its fabrication. At one time the operator was furnished the integral parts and allowed to map out his own procedure in putting them together. Often the sequence of operations has an important effect on the final product, and it is obvious that this haphazard approach did not always give the best results. Nowadays, through cooperation of the engineers and the shop, the welded unit is designed to follow a certain sequence of subassembly and final assembly. The critical welds are made where they are most accessible and the entire process is planned as would be any progressive manufacturing procedure.

The entire technique rests on the basis of study of individual welds. Lukenweld has made detailed analyses of many types of butt and angle welds. Tests on the metal parts themselves are augmented by polariscope examination of typical cross sections made of transparent plastic materials.

Passing polarized light through these plastic sections reveals the stress bands and especially the stress concentration. It shows graphically the internal condition of a section under load and emphasizes the points where failure is likely to start.

For instance, in butt welding, four types of joints have been tested by Lukenweld: the reinforced weld, the double V, the single V and the plain butt weld without special preparation of the plate. The Lukenweld definition of a reinforced weld is not that sometimes used to designate a heavy outside bead; in fact this reinforcement may actually prove harmful by increasing stress concentration. The Lukenweld reinforced weld is made by a V weld about two-thirds the thickness of the plate, chipping another V from the opposite side into the weld already completed and forming a second weld extending into the first one. According to Lukenweld engineers this is the only method that gives 100 per cent fusion without any center opening or crack between the plates. A similar procedure is followed for angle welds.

Two test tables are reproduced here, one for butt welds and one for angle welds. Based on 100 per cent strength for the reinforced weld in each instance the relative merit of other welds is given for both static and fatigue loading.

Butt Welds

	Static Load	Fatigue Load
Reinforced	100	100
Double V	83	33
Single V	72	15
Plain	58	10

Angle Welds

	Static Load	Fatigue Load
Double V Plus Fillets	100	40
Double Fillet	80	25
Fillet one side only	30	7

It will be noted that while other types of welds fall off in efficiency at a moderate rate for static loading the loss of strength is far more drastic for fatigue loading.

This does not mean that reinforced welds are or should be used in every case. In many designs rigidity rather than strength is the controlling factor, and one of the other welds may be plenty strong for the service required. It does mean, however, that care must be exercised in specifying the kind of weld to be used in each position in order to obtain the most effective assembly.

Parents Day

GORDON W. RICHARDS

Do you know what we apprentices think would be all right? We think we should be allowed to have an "Apprentice Parents Day," a day (most likely a Saturday) when we could show our folks and friends through the plant, show them what we are doing. Perhaps we might even run a radial drill press or one of the big grinders—just to impress 'em.

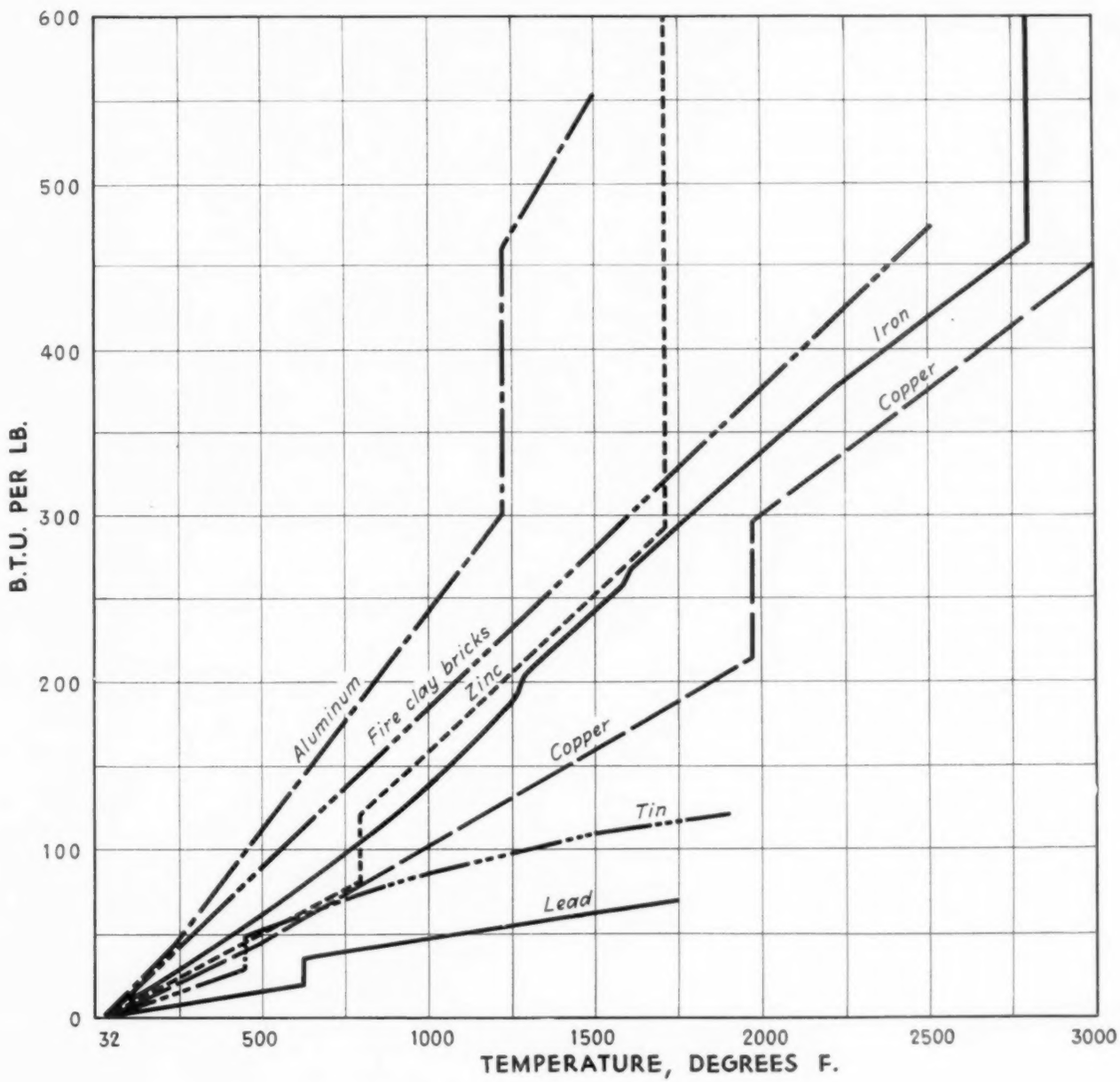
Personally I think Pop believes I'm a shoemaker. I'd like to show him different!

AMERICAN MACHINIST *Reference Book Sheet*

Thermal Capacity of Metals and Fire Brick

THIS chart gives in curve form the thermal capacity of various metals and firebrick, and saves looking up information in several tables. It is especially useful in furnace calculations.

Temperature is indicated by the vertical lines and B.t.u. content by the horizontal lines. To find the heat content of iron at 1,500 F., follow the vertical line to its intersection with the diagonal line labeled iron. Follow the horizontal line to the left to find that the heat content per pound of iron at 1,500 F. is 242 B.t.u.



Courtesy of the Surface Combustion Corporation

IDEAS FROM PRACTICAL MEN

Simple Tool Shears And Points Small Pins

CHARLES WESLOW

Not long ago I was called upon to make a small quantity of round-pointed pins from $\frac{1}{16}$-in. diameter cold rolled stock. It was necessary that these pins be spherically pointed on one end, as shown at *A* in Fig. 1. Two simple drill rod pieces made as shown at *B* and *C* were the only special tools needed for performing both operations in a standard drill press.

The combination punch and pointing tool shown at *C* was made by drilling a $\frac{1}{16}$-in. diameter hole across the flats near the end and then milling a V-groove so that each side of the groove touched the drilled hole at the cross diameter. An enlarged view of the point of this tool is shown at *D*. Piece *B* was made from $\frac{3}{8}$-in. diameter drill rod and was drilled through the center for its entire length to provide clearance for the $\frac{1}{16}$-in. diameter stock from which the pins were made. One corner was chamfered as shown. Both pieces *B* and *C* were hardened before use.

For shearing the pins to length, piece *B* was clamped in a V-block that I made a number of years ago and has been described previously (*AM*—Vol. 79, page 239). It was held in place, with the chamfered side at the top, by means of the clamp plate *H* and screw *K*. The piece *B* was allowed to project from the end of the V-block *F* approximately $\frac{1}{16}$ in. for clearance. A spacing block *L* and stop block *M* next were mounted at the end of the V-block with screws as shown in Fig. 1. Next tool *C* was inserted in the chuck of the drill press and positioned so as to bear tightly against the end of piece *B*. The V-block *F* next was clamped to the table so that it would not move during the shearing operation. The drill rod stock then was inserted in the hole in piece *B* and pushed against the stop plate *M*. Each vertical stroke of the drill press spindle, which was moved by hand, produced a pin sheared to length.

For pointing the pins, tool *C* was set vertically in the vise *T*, and a shim plate *N* and guide plate *P* were clamped at one side of the tool end by means of a toolmakers clamp *S*, as in Fig. 2. Shim plate *N* was selected from stock equal to one-half the diameter of the rod from which

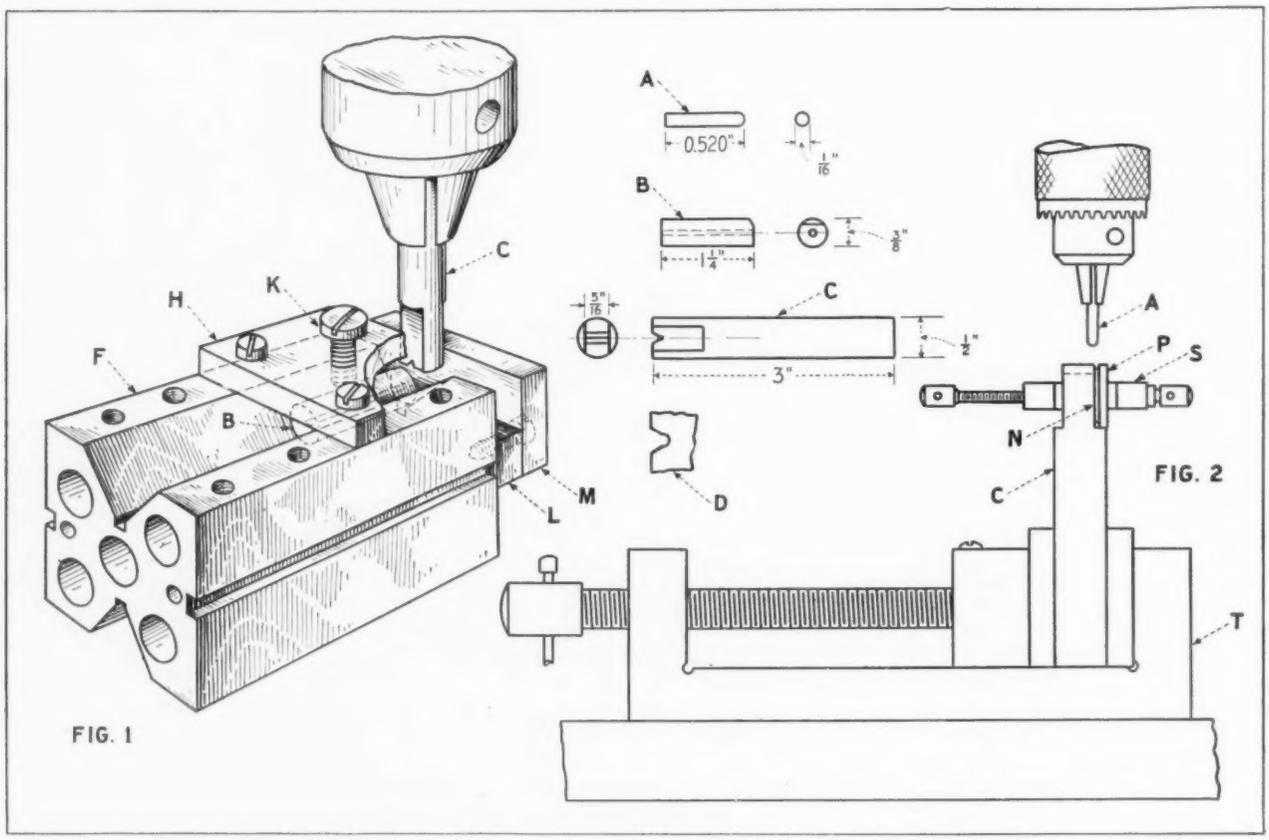


Fig. 1—This simple set-up was used to shear pins accurately to lengths from $\frac{1}{16}$-in. diameter cold rolled steel rod. Tool *C* is held in the chuck of a standard drill press and reciprocated vertically by hand to shear the pins. Fig 2—after being sheared to length, the pins were spherically pointed on one end with the same tool. Shim plate *N* is used to space the stop plate *P* so that the tool will cut along the diameter of the pin

the pins were sheared. This shim served to guide the pin *A* so that the edge of tool *C* would cut along the diameter of the pin when the pin was held against plate *P*. Once this assembly was lined up with the spindle of the drill press, pins placed in the chuck and brought down against the tool were pointed accurately to a spherical shape rapidly and economically.

Holes in Hardened Tool Steel

C. G. WILLIAMS

Referring to the article by A. Schuneman under the above title (*AM*—Vol. 82, page 730), I want to say that during the World War we drilled hardened armor plate by the method described by Mr. Schuneman, except that instead of grinding compound we used diamond dust which did the work much faster. We also drilled hardened dies in a gun shop by the same method twenty years before that.

But why use a cutting material that takes so long to do the work? Why not use a drill tipped with a good grade of titanium-carbide and go to it?

A large firm wanted some hardened coining dies trued up without going to the expense and risk of annealing and hardening them again. They had been grinding them, which took 14 hr. I had one of the dies set up in a lathe and took a cut off of it in 7.5 min., using a tool tipped with titanium-carbide. The die had a hardness of 68 Rockwell-C, so why not get some carbide tipped tools and go after those "hard jobs?"

Chevron Packing Made in Simple Tools

N. V. SMITH
President
Smith-Johnson Corporation

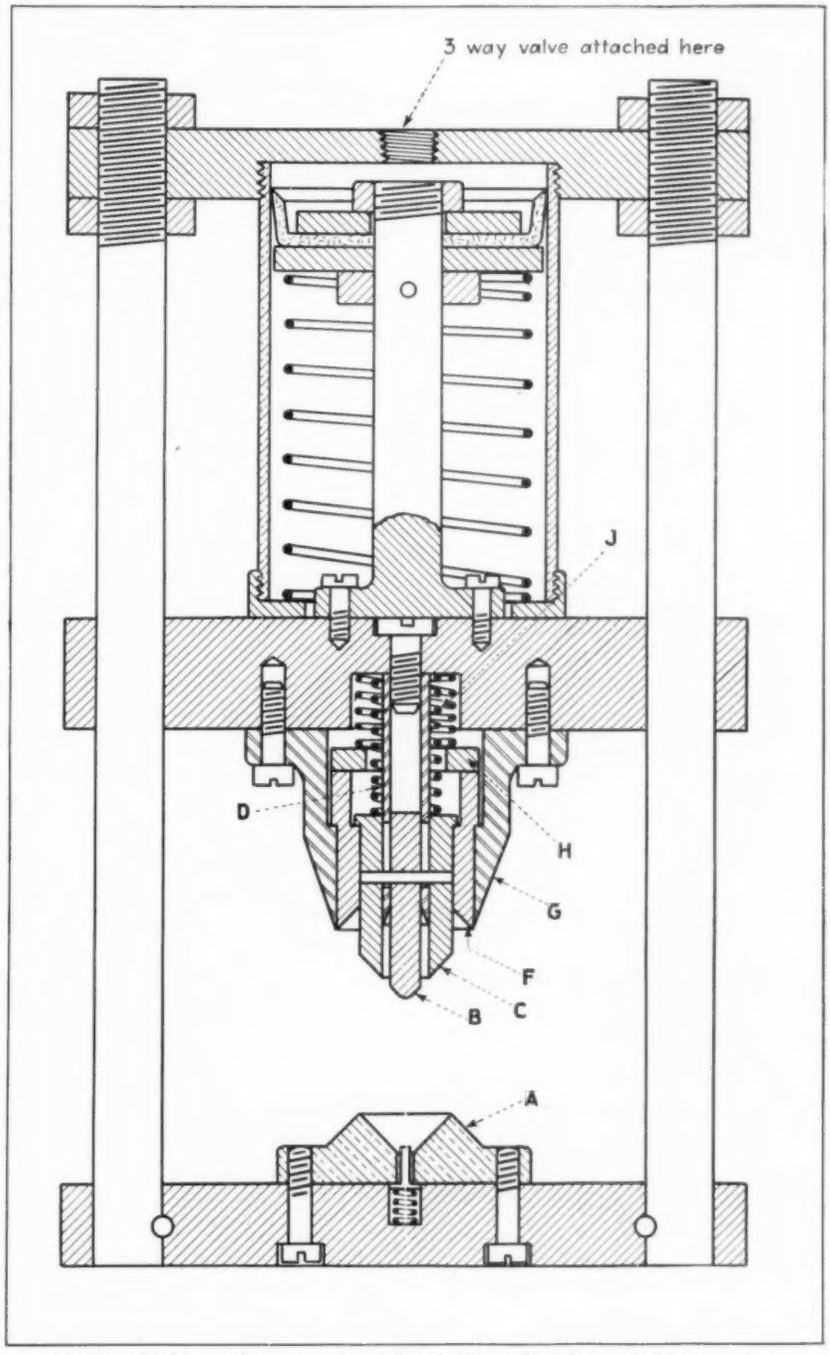
Popularity of the relatively new chevron packing is only affected by its cost. Our company, which wished to adopt this form of packing, was faced with the necessity of finding a rapid and cheap method of production.

Considerable design work was first done, as well the building of three different types of dies before the type illustrated was selected as the best form. Generally speaking, the method of using this equipment is to cut disks from uniformly split and treated leather hides. These disks are made a little larger than the finished product. After warming until they are soft and pliable, the disks are laid hair side down on die *A*. The three-way operating valve is then manipulated to form and trim one packing ring per stroke of the tool.

The production rate from this equipment is about 12 rings per min., which is half the time required by the conventional method of employing a spinning lathe and trimming knife. Also, a specially trained operator is not needed. Another valuable feature of the apparatus is that every ring will be an exact duplicate of every other one, so that when assembling in the packing box it is not necessary to select each ring.

The cost of the dies must be balanced against the estimated production. In this connection we have three dies for rings $\frac{3}{16} \times \frac{5}{8}$, $\frac{3}{8} \times 1\frac{3}{16}$ and $1\frac{1}{16} \times 1\frac{1}{8}$ in. These tools were made up in 20 hr. each after the drawings were made, and they paid for themselves during the first month.

Construction of such dies should not be attempted until the basic principles are understood. These are:



Chevron leather packings are formed and trimmed at the rate of 12 per min. in these tools, which are operated by compressed air controlled by a three-way valve

first, the die must dwell in its closed position so that the leather will have time to set in its formed shape; second, forming must be completed before any cutting action takes place; third, the forming of the inner cone must be completed before forming of the outer cone takes place; and fourth, the plug *B* is essential to a sharp clean-cut inner lip on the packing.

The forming and cutting block, *A*, should be made of brass or copper so that the sharp cutting edges of the trimming knives will not be chipped or split. The inner forming plug *B* is pinned to hold-down *C* as shown. This pin slides in a slot cut in the trimming knife *D*. Conical faces *B* and *C* must lie in the same "conical plane." These parts may be made of soft steel after the completion of the inner knife so that they may be fitted to it with not over 0.0015 in. clearance.

Part *F* is the forming plug for the outer cone and can also be made of soft steel. It should not have more clearance between *G* and *C* than 0.0015 in. The outer trimming knife *G* should be made of tool steel, hardened and ground to a sharp edge. The inner trimming knife *D*, also made of tool steel, is hardened and ground. Care should be taken that the cutting edges of these two knives lie in the same plane after assembly.

A soft steel stop washer *H* assures that hold-down *C* and the outer forming punch *F* will stop their movement with their inner faces forming a right angle. This spacer washer should allow these parts to slide past the cutting edges a little farther than is needed to cut through the thickness of leather used at a 45-deg. angle.

Inner cone spring *J* must be strong enough to form the inner cone, while the same can be said for the other spring which forms the outer cone.

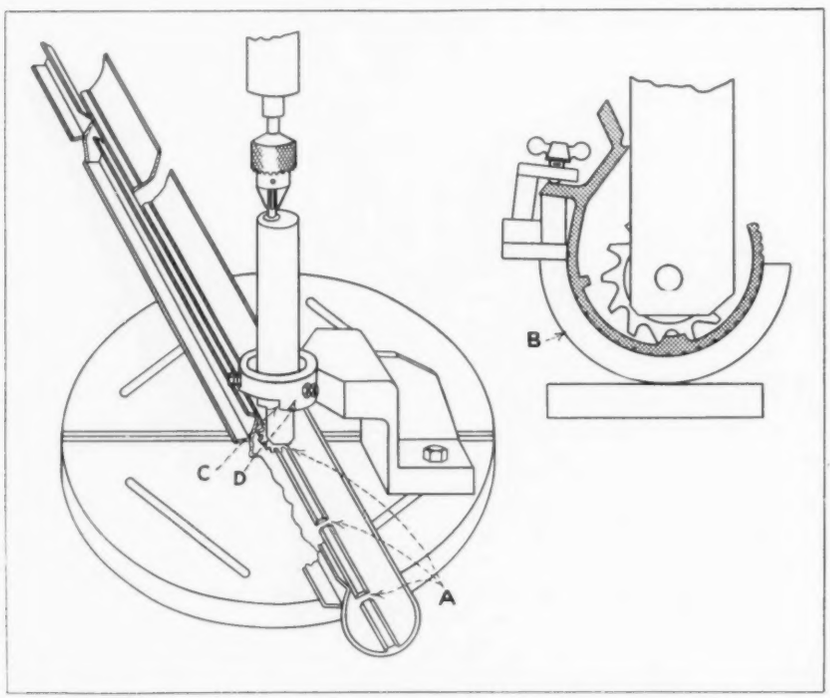
The plates forming the cross members may be either machine steel, or a standard die set of light pattern can be employed. Proportions of the pneumatic cylinder depend on the size of the packing to be cut. In our case about 1,200 lb. pressure is required to cut and form a $\frac{3}{8}$ x $1\frac{3}{16}$-in. ring from $\frac{1}{16}$-in. thick leather. We have also found that it helped to slow down the air flow ahead of the operating valve so that the piston travels somewhat slowly and gives the leather time to form without fracture.

Cutting Slots With a Keyway Miller

JAMES E. KEARSLEY
Mechanical Supervisor
Safety Car Heating & Lighting Co.

We recently had the job of cutting several slots $\frac{5}{16}$ in. wide and 3 in. apart in a number of aluminum extrusions of semi-tubular shape, 10 ft. long. Referring to the illustration, the slots *A* were in such a location that ordinary milling methods were out of the question. The job was done in a drill press equipped with a keyway miller, the work being held in the simple fixture *B* in the enlarged view at the right, the spacing of the slots being controlled by an index stop not shown.

Since the tool was originally made for cutting interior keyways, the cutter operated at one side of the body, whereas we required it to cut at the bottom only. We therefore cut off enough of the bottom of the body to permit the cutter to protrude, and cut away the side to prevent interference with the edge of the work. No change whatever was made in the interior mechanism. To prevent the body of the tool from revolving, the step *C* on collar *D* made contact with the edge of the work.

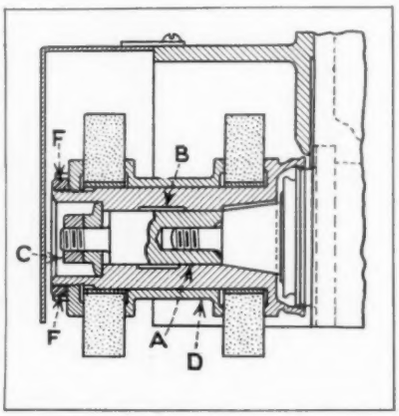


The slots were cut in the bottom of the work by a keyway miller having its lower end cut off to permit the cutter to project

Increasing the Capacity of a Surface Grinder

R. C. HEINMILLER

Some machine tables required to be trued and it was decided to do the work by grinding. The tables were 24 in. in width and the largest horizontal surface grinder available had a cross-feed of only 18 in., but its range was increased sufficiently by the method illustrated.



The cross-feed capacity of the grinder was increased by mounting two grinding wheels on an adapter

An extension piece *A* was screwed on the threaded end of the spindle usually occupied by the nut for holding on the grinding wheel. The adapter *B* was slipped over the extension piece and was held thereon by the flanged nut *C*, its inner end being made to fit the tapered nose of the spindle. Two 2-in. face grinding wheels were mounted on the adapter, being spaced about $5\frac{1}{2}$ in. apart by the flanged spacer *D*. The wheels were securely held on the adapter by the collar nut *F* on its threaded end.

NEWS OF THE INDUSTRY

Trade Treaties with Britain and Canada Generally Favorable to Metal Trades

British agreement worries power transmission chain makers, but does not affect machine tool builders

NEW YORK — Manufacturers of power transmission chain are considered by some observers to be the hardest hit of all the metal-working industries by the new three-year trade treaty with Great Britain, effective January 1. In accordance with the most-favored-nation system this concession is apt to benefit Japan more than anyone else. Japan began the manufacture of such chains some years ago and since labor represents about 50 per cent of their cost of manufacture, some considered the original duty of 40 per cent none too high and the new duty of 25 per cent ruinous.

Machine tools are not mentioned in the treaty, so that the present status of 20 per cent duty on imports into the United Kingdom and 30 per cent on imports into this country still holds. For some time Great Britain has not even charged the 20 per cent on most tools because of its Finance Act of 1932 which permits the free entry of tools for certain specific purposes.

Other Concessions

Reductions of sizeable quantity were given on imports into this country on internal combustion engines of several classifications, tobacco, cigarette and candy machinery of various kinds, with smaller concessions on reciprocating steam engines (except locomotives). In its supplement to the treaty, the Department of State pointed out that in this classification the total imports from the United Kingdom were valued, in 1937, at about $5,000,000.

Actually it is too early to judge the effects of many portions of the treaty and only experience can give the answer. However, in view of the situation in both countries it had to be expected that any bargaining that was done would revolve around the predominantly agricultural phase of this country versus the predominantly manufacturing phase in Great Britain. With this in mind it must be considered that in general the metal-working industries faired pretty well.

Most-Favored-Nation Problem

One factor that must be always kept in mind is the most-favored-nation aspect and the possibilities of competition in the various classifications on which import duties have been lowered from countries outside of Great Britain may be more important than indicated at first glance at the treaty. Some think that most-favored-nation agreements now have gathered such momentum that Germany, Italy and Japan will have to put most of their trade on that basis if they are to continue to be important factors in international commerce. Germany's foreign trade is now past its peak as it has been declining for nearly a year.

Raw metals are affected by the treaty only to such extent as the metal-working industries are affected. Some favorable concession gained for industries in this country amount to about one-fourth of the duty now being paid on office machinery and appliances, electrical appliances such as refrigerators, washing machine, vacuum cleaners, air conditioning equipment and less important items.

Good concessions were gained on gasoline and oil pumps, laundry and dry-cleaning equipment, certain glass-working machinery and packaging machinery, rotary newspaper printing machinery, typesetting machinery, and certain textile machinery.

Farm Gains Benefit All

With the influx of cheap automobiles into Great Britain, primarily from Germany, there has been considerable agitation for raising the already high import duty on automobiles. The duty is now 33½ per cent on imports from non-British countries and one-third lower on imports from British countries. The agreement safeguards the American trade in automobiles of 25 hp. or more with additional concessions for them in New Foundland and in some of the other British Colonies. It is expected that the volume of trade will be greatly benefited from these.

One favorable factor which must not be overlooked is the concessions gained for agricultural products. In view of the fact that we have been suffering with wheat surpluses and other food surpluses, particularly in the citrus food industries, for the past year, any treaty to relieve that situation should be of general all-around benefit. The fact that wheat, for example, now enters the United Kingdom duty free should keep the agricultural situation on an even keel with consequent benefit to implement and tractor manufacturers. Expenditures in this field have been running over $500,000,000 for some years which represents a lot to the steel and machinery manufacturing industry generally. Then too good times for the farmers mean that he has more money to spend for automobiles which again gives general industry in this country a great impetus.

Canadian Treaty Favorable

The new treaty with Canada revises and supersedes the previous agreement known as the 1936 agreement. Special excise tax of 3 per cent has been eliminated from many products, while the rates of duty on industrial machinery of all classes appear to have been either further lowered or continued at the level of the 1936 treaty. Certain favorable reductions in duty on goods imported into Canada include diesel and semi-diesel engines and parts, chain for manufacture of agricultural implements, railway locomotives and motor cars and parts not made in Canada for mining, metallurgical and sawmill operations, specified frames, castings, etc., for railway rolling stock. Other sizeable decreases were obtained on certain specified construction and road building machinery not made in Canada, automatic machines for making and pack-

aging cigars and cigarettes. Duties on miscellaneous machinery of a kind not made in Canada were reduced from 20 per cent down to 10 per cent. Estimates are that about half of the 1937 exports to Canada were machines of this kind so that such a reduction is of considerable all-around benefit.

No mention is made of automobiles in the treaty with Canada, so that the present status is retained where three car manufacturers are maintaining plants in Canada, while the smaller ones find it more profitable to sell from this country and pay the duties which were reduced in the last few years.

The effect of reduction in certain mineral products imported from Canada cannot yet be judged as the duties on the three important items, nickel, aluminum, and zinc have been reduced by one-fourth or less. According to a supplement to the trade treaty the rates fixed in the agreement will leave substantial protection for the domestic producers.

Conservatives Gain Union Control After Radicals Are Rebuked at Polls

Organized labor convinced it cannot swing even local elections without substantial middle-class help

FRANK RISING
Labor Editor, *American Machinist*

PITTSBURGH—Conservatives have control of the labor unions, including the Congress for Industrial Organization (new name for C.I.O.). On whether management takes advantage of that fact depends pretty much the course of collective bargaining the coming year.

Organized labor is taking a realistic view of things since the election. The "red hots" have been rebuked either at the polls or in private union councils. At the C.I.O. convention in Pittsburgh, there was plenty of evidence of the conservative trend. The American Federation of Labor leaders have made moderate public statements. Altogether, the chances for a frank, honest discussion of management's problems with labor will be propitious in the months ahead.

Major trends in organized labor are as follows:

1. With the business upturn and reemployment of many union members, the heat is off in the share-the-work and 30-hour-week campaigns. "Share-the-work" may never come back. Especially among the United Automobile Workers, the rank and file of unionists have decided that "bitter-ending" on that point means all starving together.

2. Except for the packing-house campaign and another "try" at Ford which is mostly talk thus far, no major labor organization drive is in sight. One reason is that leaders in steel and metal-working unions favor a long-term careful campaign of constant pressure rather than abrupt blows. Another is that the wage-hour law has turned thoughts of organizers to the homework and piecework industries, scattered through the South. Still another is the low state of union finances (indicated last week by the U.A.W. call for a one-dollar special contribution from each member).

3. The C.I.O.-A.F.L. conflict still waits on mediation, neither side being willing to invite the other to a conference for fear of losing face. So far as the rank and file are concerned, everyone on the C.I.O. side wants to end the quarrel. A large majority of A.F.L. workers too, are tired of it. A few members of the A.F.L. executive council still say that the C.I.O. is "disintegrating," but they might change their minds if the teamsters and printers decline to fight any longer.

4. Labor legislation in the next Congressional session probably will include amendments to the Wagner Act and the Wage-Hour Law. The administration itself, through Senator Wagner, may offer a revised Wagner Act. Failing this, the National Labor Relations Board may move to let employers seek aid in clearing shop jurisdictional tangles. Proposals for changes in the Wage-Hour Law aren't sufficiently jelled yet to allow discussion before next Spring.

5. Organized labor is pretty well convinced that politically it cannot swing an election, even locally, without substantial middle-class help. This means that the coming year will see the unions studying "public relations" in an effort to find out where they slipped up in the 1938 campaign. As they go along, unions will "soft-pedal" public blasts of violent language and will direct carefully-planned sales campaigns at the general public.

Added together, these trends point toward a better opportunity in 1939 for sane adjustment of labor-management problems than did 1936, 1937 or 1938. The issue seems clear on management's side. If fair dealing prevails, a good spirit is likely to rise in the unions to meet it. If management comes out fighting, the war will be on again by midwinter.

U. S. Government Contracts Awarded to Metal-Working Firms

(Awarded from Oct. 31–Nov. 19 inclusive)

Contractor	Gov't Agency	Commodity	Amount
Hansell-Elcock Co., Chicago, Ill.	Interior	Bulkhead gates	$23,680
Scovill Mfg. Co., Waterbury, Conn.	War, Ordnance	Cartridge disks	50,535
Scovill Mfg. Co., Philadelphia, Pa.	Treasury	Nickel blanks	52,000
Davey Compressor Co., Kent, Ohio.	Farm Sec. Admn	Air compressors	20,447
Pelton Water Wheel Co., San Francisco, Calif.	Interior	Turbines	108,773
Lodge & Shipley Machine Tool Co., Cincinnati, Ohio	Navy, S&A	Lathes	12,749
Pratt & Whitney Co., Hartford, Conn.	War, Ordnance	Tool room machine	19,953
Bradley Machinery Co., Rockford, Ill.	War, Ordnance	Boring mills	41,950
Carlton Machine Tool Co., Cincinnati, Ohio.	War, Ordnance	Radial drill	18,940
Vandyck Churchill Co., Philadelphia, Pa.	Navy, S&A	Boring and turning mill.	13,476
Wm. Sellers & Co., Philadelphia, Pa.	Navy, S&A	Boring machine	39,500
Allis-Chalmers Mfg. Co., Milwaukee, Wis.	TVA	Circuit breakers	29,990
Westinghouse Electric & Mfg. Co., Denver, Colo.	Interior	Generators	195,320
Falk Corp., Milwaukee, Wis.	Navy, S&A	Gears	771,540
Northern Pump Co., Minneapolis, Minn.	Navy, S&A	Pumps	23,149
Wright Aeronautical Corp., Patterson, N. J.	Navy, S&A	Engines and parts	222,755
United Aircraft Corp., Pratt & Whitney Aircraft Div., E. Hartford, Conn.	Phila. Navy Yd.	Aircraft engine parts	37,818
Westinghouse Electric & Mfg. Co., Pittsburgh, Pa.	War, Ordnance	Assemblies, metal parts.	111,000
National Tube Co., Pittsburgh, Pa.	War, Ordnance	Assemblies	324,170
Mueller Brass Co., Port Huron, Mich.	Navy, S&A	Brass forgings	44,647
Worthington Pump & Machinery Corp., Washington, D. C.	Navy, S&A	Compressors	47,649
Cincinnati Milling Machine & Cincinnati Grinders, Inc., Cincinnati, Ohio	War, Ordnance	Machining equipment	75,438
National Acme Co., Cleveland, Ohio	War, Ordnance	Automatic screw machines	34,144
Baldwin Southwark Corp., Eddystone, Pa.	War, Ordnance	Powder presses	208,800
S. Blickman, Weehawken, N. J.	War, Ordnance	Mechanical dippers	148,294
American Car & Foundry Co., New York, N. Y.	War, Engineers	Cars, tank	63,200

DETROIT LETTER

Car production and employment likely to dip in January and February preceding Spring spurt . . . Show attendance off, but buying good . . . Equipment purchases dull . . . 1940 tooling programs not yet out . . . General Motors to make loans to employees

RUPERT LE GRAND
Detroit Editor, *American Machinist*

DETROIT—Though the automobile industry is moving at a hot pace, it will be surprising if production and employment do not dip during January and February before the Spring push starts. Ever since Fall introduction of new models began back in November, 1935, January and February have failed to attain the November and December volume. This experience is likely to be repeated this winter. However things look good just now.

Used cars are no problem. The industry did a remarkable job of cleaning out stocks in late summer and early fall. Trade-ins on new models will be moved through close cooperation between factory and dealer. There will be no need for million-dollar advertising splurges to get rid of sluggish accumulations.

Output is currently running at 95,000 units per week. This rate should give the industry a 1,000,000-car last quarter, which is short only 60,000 units from the fourth quarter of 1937. Production is now outstripping the last weeks of last year, but October accounts for the loss compared with '37.

Sales Exceed Deliveries

Deliveries are several weeks behind on most models, and some of the higher-priced lines cannot make deliveries until early next year. The new Mercury is attracting orders from prospective purchasers of other cars, though deliveries are a month away from receipt of order.

Add the impetus of show sales to what has gone before, and it is easy to see why Detroit is optimistic. Evaluation of the shows is particularly difficult this year because all lines were on exhibition in dealer showrooms weeks ahead. Seasoned sales executives say that the people who went to the shows were more of a buying crowd than expected. Attendance was off, except in localities where dealers had whooped up enthusiasm through much fanfare and promises of elaborate entertainment. Chicago and San Francisco shows were well attended, and sales in Chicago were said to be as good as in New York. Detroit claimed the best sales in ten years.

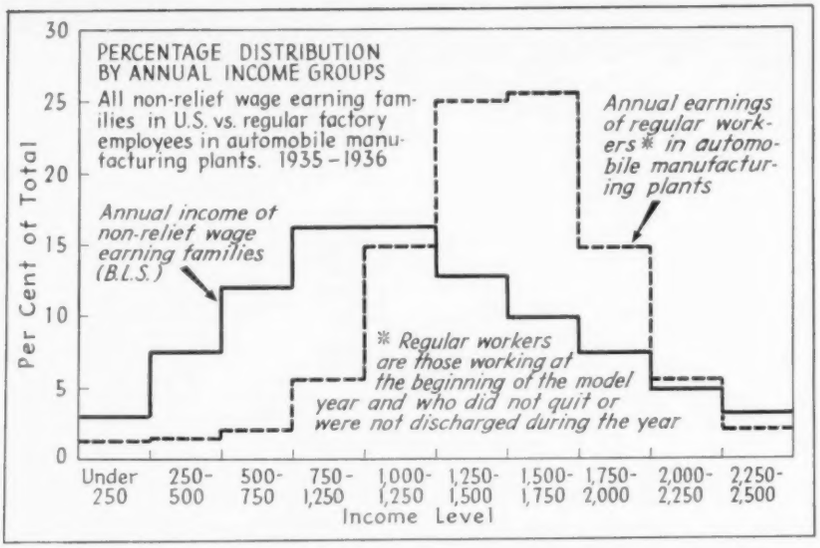
Not Too Optimistic

Flush times are not here yet, if one judges the attitude of the public in selecting 1939 models. Deluxe cars are in greater demand than standard jobs, but that doesn't mean money is any freer. People who can't afford a better car specify a cheaper deluxe model with all the trimmings to keep up their personal vanity. The strongest indication of an expanding market is when people stretch up instead of step down. If there is a surge toward the lower medium-price class four or five months hence, automobile executives will forget the caution which is now their watchword.

Plants are working five days a week and in most cases to the limit of the tooling provided for 1939 models. Means can be found to step up production if warranted next spring without any great outlays. Much extra capacity could be put to work. For this reason, the future does not look too bright for machinery orders, except for occasional machines or replacements of worn-out equipment. Inquiries on 1940 tooling programs are non-existent, despite the fact that some types of machine tools take six to eight months to build.

Chevrolet is a good example of a huge customer that is shy on giving orders for new equipment. Production is running around 25,000 cars a week, which may be the limit of the plants as tooled up, but certainly not for the machine capacity installed. There is no chance that additional equipment will be installed in the near future. Though remarkable manufacturing savings are being made at Buffalo, production will not

First Off New Assembly Line—K. T. Keller, president Chrysler Corp., "O.K.'s" the first truck to roll off the final assembly line at the new $6,000,000 plant recently put into operation by Dodge. Looking on are J. D. Burke, Dodge Truck sales director, and L. J. Purdy, general manager of the new factory



By 1936, the last year for which figures are available, the automobile industry had taken long strides toward assuring annual incomes for its employees far above minimum health and decency standards. This chart shows that the greatest concentration of income for individual automotive workers is between $1100–$1600 per year, whereas the U. S. Board of Labor Statistics report (solid line) shows that entire non-relief wage-earning families got only $600–$1100

be shifted there from Flint. Such action might alienate public opinion and stir up labor trouble. The savings in cost to be gained from such a move would not be worth the price of trouble.

For the winter months, at any rate, chief interest of the automobile industry will be the leveling of production and the maintaining of employment. Management is convinced that such a course brings big returns. For one thing, the industry realizes the value of high annual incomes for its workers—which is one of the prime reasons why it vigorously combatted the idea of a 32-hour week. The industry is proceeding on the basis that well-paid employees are a better asset to itself and to their communities than people struggling along on share-the-work programs.

A Measure of Security

The idea of stabilizing employment by leveling production is now being practiced by all the major companies, but it remained for General Motors to provide some measure of economic security for its shop employees. Two benefit plans have been announced, effective in January. At least 150,000 men will be able to budget their expenses over a year on the basis that they are sure of 60 per cent of their standard wages. What that will mean to their families and to the stability of their communities is impossible to predict.

There is no intention of guaranteeing an annual wage. The plan provides for loans to employees of amounts up to the difference between their incomes when business is slack and 60 per cent of the standard weekly wage. No interest will be charged and the loan is repayable only through an opportunity to work. Eventually it is hoped to extend the benefits of these plans to 37,000 salaried workers.

Union Leaders Protest

In the income security plan, the corporation will loan to five-year employees, upon request, the difference between actual earnings and 60 percent of standard weekly earnings, less unemployment compensation. When the employee's earnings again exceed 60 per cent of standard, he repays the company at the rate of one-half of the excess. Employees of two years, and less than five years standing are able to borrow against a credit of 72-hours' earnings when their income falls below 40 per cent of standard. Such men will not repay borrowings until earnings again exceed 60 per cent of standard.

Announcement of this program drew outcries from labor leaders, who probably saw in it the means of nullifying their immediate objectives—a modified checkoff in GM plants. These leaders too, have declared for a guaranteed annual wage, which neither General Motors nor any other company is willing to discuss. A modified checkoff is generally conceded to be one privilege which General Motors will not give the union.

A.S.T.E. Will Study Social Aspects of Machine Age

DETROIT—Every resource of the American Society of Tool Engineers will be employed in a nationwide program to determine the effect that the machine has had on employment and the standard of living, according to an announcement by Walter F. Wagner, A.S.T.E. president. Revealing that the society had appointed a fact-finding committee under the direction of John M. Younger, professor of Industrial Engineering, Ohio State University, Mr. Wagner repeatedly stressed the need for tangible

WALTER F. WAGNER

data about this controversial subject.

"There is probably no question as vital to Society in general today as the problem of what effect the machine is having on employment—on the standard of living and income of the nation as a whole," asserted Mr. Wagner. "Not a day goes by but that claims and counter-claims are propounded publicly to the effect on the one hand that the machine is creating unemployment, and on the other that the machine is responsible for increased employment . . . "

In accepting the appointment as general chairman of the committee, Professor Younger pointed out the difficulties of so tremendous a task and outlined the committee's plans: "In general, the attack on the problem will be three-fold, depending on the starting point: development of industry, development of the machine, and developments pertaining to labor . . . As fast as certain phases of the study are completed, the information will be made available to all interested parties."

Canada Expands Aircraft and Munitions Manufacture as Part of Empire Defense

Canadian companies enlarge capacity as British orders insure development of profitable war industries

MONTREAL—Now that Britain is desperately speeding up her rearmament program, Canada will at last swing into manufacture of munitions and other war materials on an expanded scale if present plans between the two countries go through as anticipated. Climaxing over two years of preliminary arrangements, the plan calls for a volume of British orders large enough to make the development of Canadian war industries profitable, in return for her cooperation toward "Empire defense."

In addition, it is expected that Canada will raise her annual defense appropriations to $50,000,000, an increase of $15,000,000 over her current expenditures. Major item in the budget, as for the past two years, will be aircraft and related equipment. Even back in 1936 the development of the airplane had reached a point where Canadian fear of air attack caused the dominion government to increase the annual defense appropriation by some 75 per cent. It was during this period that joint plans with Britain were inaugurated, although cooperation was hampered by a fundamental difference. While Canada wanted to concentrate on aircraft manufacture, Britain stressed the development of facilities for turning out all types of armament—some of which would be useless to Canada herself—for Britain's use in protecting her Empire generally.

Will Fly Planes to England

As a result, the only Canadian armament industry worthy of the name is the aircraft industry, which has been developed in the past two years and is still growing. Part of this expansion has been in expectation of business from Britain, already behind in her aircraft program. One of the first tangible indications of progress in the joint program was the drawing up of plans for a new central company to be responsible for delivery in England of huge modern bombers, Britain's most immediate need. Parts will be made by the various Canadian airplane producing companies and assembled at two new plants to be built by the central company. Motors will be furnished by the British government from England and the completed planes flown to Britain.

On the basis of present expectations of new British business, Canadian Car & Foundry Co., one of the leading airplane producers, has scheduled impressive increases in its working staff. The Aluminum Co. of Canada has started construction of a large addition to its Toronto plant, and other companies are undertaking corresponding expansion.

Moreover, Canadian Car & Foundry has recently started production of the first airplane engines made in Canada. Several British motor producers and at least one leading U. S. airplane motor manufacturer have formed Canadian subsidiaries and plan to erect plants in the Dominion. American industries aside from machinery builders are expected to benefit but little from this expansion since Canada is well supplied from a raw materials standpoint.

Progress Being Made

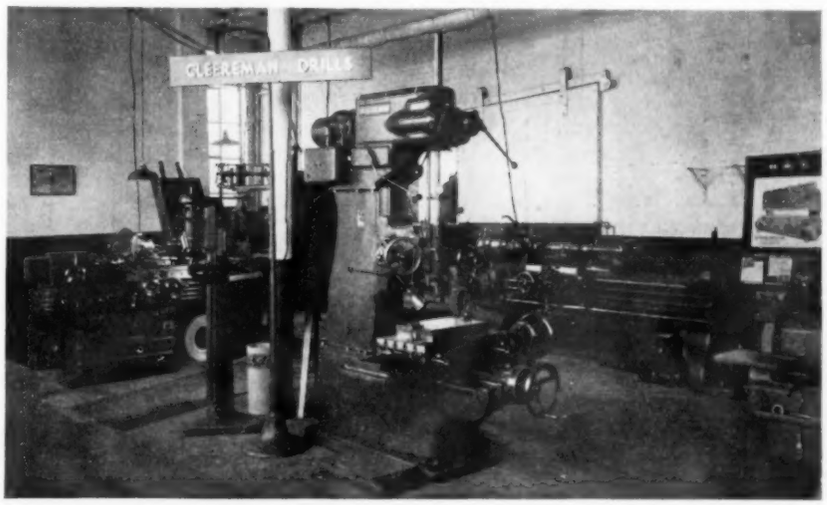
While development of the Canadian aircraft industry has proceeded apace, production of other armaments has lagged. Last June the first progress was made in this direction, when the Canadian government ordered from the John Inglis Co. of Toronto 7,000 Bren machine guns, and the British supplemented this with an order for 5,000 more. Equipment from government arsenals in Ontario was transferred to the Inglis plant to facilitate handling the contract. Canada has also ordered from private firms parts for 10,000 gas masks, along with other minor requirements.

Although the Bren award is just the type of arrangement most satisfactory to Britain, criticism and subsequent investigation of this contract have caused a virtual halt of even small experimental orders from the government. Abandonment of the present policy seems unlikely, however, since majority opinion is averse to heavy government expenditures on arsenals for what may prove temporary production, and partly because a change of policy may endanger hoped-for business from Britain.

WPA Finds Industry Uses More Automatic Control

WASHINGTON—That the widespread introduction of measurement devices and automatic control has speeded production, improved quality, reduced costs and increased the productivity of labor is shown by a report entitled "Industrial Instruments and Changing Technology," prepared by the National Research Project of the Works Progress Administration.

Although industrial instruments have in some instances served to displace labor, Corrington Gill, assistant Administrator in charge of WPA research, stressed that they have also played an important role in the development of such new industries as air conditioning, radio, plastics, automobiles and airplanes. The report also pointed out that the adoption of industrial instruments sometimes results in changes in the specifications for the jobs available.



Buffalo Plays Host to Tool Show—A dozen prominent manufacturers exhibited a variety of machine tools at the Western New York Tool Clinic held the first week in November. Under the sponsorship of the Buffalo Machinery Co. and the W. S. Gallagher Co., the show attracted approximately 1,500 visitors who studied the machines in operation

WATCHING WASHINGTON

Battleship construction will give metal-working industry almost $300,000,000 worth of business . . . Mass production of airplanes probably will be educational orders item . . . Andrews rules on wages for apprentices . . . Mechanization of Army speeded

McGRAW-HILL WASHINGTON BUREAU
(*Paul Wooton, Chief*)

WASHINGTON—Norfolk Navy Yard will build battleship No. 57. Newport News is awarded No. 58 at $49,540,000. Bethlehem will build No. 59 at $49,815,000. No. 60 at this writing is a phantom on blue paper waiting for adjustment of bid, presumably high, by New York Ship Building. The four ships will net the metal-working industry and its workers almost all of the total $300,000,000 cost—about $50,000,000 per ship, plus around $25,000,000 per ship for armament, guns, ammunition, and propelling machinery, which the Navy provides.

The order to go ahead with 35,000-ton ships indicates the Navy is assured Japan is not actually building heavier tonnage. Probably Japan is testing bigger models, and probably this country is too. Long-distance requirements and the impending contest for influence in the Pacific point to bigger ships. Washington will not be surprised if in the next two or three years Japan lays down some heavier boats. If so, the United States will follow suit.

Although the War Department has not yet announced its determination to put mass production of airplanes on as the seventh item of the educational orders program, manufacturers visiting Washington are convinced it will be done. The talk is that a basic trainer has already been selected, possibly Stearman (Boeing) for experiment on the assembly line. The Department is working on a plan to compensate the owners of design rights, since awards may be made to other firms than the design owners.

Aircraft Competition

Germany's proposal to Britain of air-power limitation suggests eventual formidable competition against the United States for airplane markets. Germany has extended aircraft production capacity so that, if and when the world armament race ends, she must immediately seek export outlets. The same goes for Italy. Both have already established outlets in several countries. Experts say that if Japan should enter the aircraft field, she could far undersell any other producer in the world.

ARMAMENT AHEAD

Continued war clouds abroad emphasize our inadequate national defense. Even those who deplore the unbalanced budget and government extravagance in W.P.A. and other so-called emergency agencies, feel that the army and navy are worthy of increased appropriations. Popular sentiment is that an 1800-ton destroyer is better than 1800 tons of raked leaves.

Coming at this time, the annual report of Harry H. Woodring, Secretary of War, is pertinent. The report points out many military deficiencies, including inadequate canal zone defenses. With possible foes in both oceans an indefensible canal means either two navies or the danger of an unguarded coast. If bomb-proofing is feasible, as the secretary says, it should be worth its price in battleships. Motorization and mechanization have progressed but still need attention and appropriations.

Aside from the report, the War Department wants U.S. plants now building 320 units a month on one shift to triple the output by stepping up to three shifts. Two-thirds of the increase would be sold to Hispanic countries for defense of the hemisphere; the rest to France and England. Barter of planes for tin, rubber and manganese is proposed, but Secretary Hull disapproves.

With the stage set by the army and navy themselves and a public aroused by new European disturbances. Congress is sure to be armament minded whatever its views on other subjects.

Regulations applicable to employment of apprentices at wages lower than minimum under the Wage-Hour Act have been issued by Administrator Andrews. Wage-Hour Division and the Federal Committee on Apprenticeship have agreed that applications and certificates of exemption shall conform to FCA standards. Wage-Hour Division furnishes application forms. Certificates are granted only where there is an agreement between apprentices and employer or authorized agent. The agreement must be approved by the State Apprenticeship Council.

Wage-Hour Rulings

Signed agreements of employees to work longer than maximum hours without time-and-a-half pay is illegal, Wage and Hour Administrator Andrews has ruled. He has issued a warning against any fixing of records. Andrews stands his ground against cutting above-minimum wages for the purpose of paying time-and-a-half. Washington opinion is that the courts will uphold his ruling. Probably there will be no Supreme Court answer to the question till 1940. Any court cases are likely to be initiated by the Administrator. No injunction proceedings by employers are in the offing as yet.

Preparing for War

Mr. Roosevelt, apparently with general approval of the nation, has determined to repel aggressors in the Americas with whatever force of arms is necessary. Assistant Secretary of War Louis Johnson has publicly raised the Army aircraft goal to 9280 planes, with increased aeronautical research and improvement of line production. He has asked for money and industrial preparation to build anti-aircraft guns and anti-aircraft cannon, already perfected. He wants shortages made up in artillery, tanks, rifles, ammunition, gas masks, searchlights and instruments. He thinks a six months' supply is needed of all items except food and clothes. Industry should be geared up to get in full war swing in six months at the latest.

Charity will go to war. President Roosevelt has talked with the War Department and WPA officials about shifting job-making money from civic projects to Army base operations. . . . . National Defense Power Committee is working out standardization of temperature, voltage and power factors of steam turbo-generators for speed of production in emergency.

J. C. WARD, JR.

H. M. HORNER

A. W. HERRON, JR.

War-Time Importance of New England Stressed

BOSTON—Industry in New England plays a vital role in the War Department's industrial mobilization program, according to Assistant Secretary of War Louis Johnson, speaking before the industrial session of the fourteenth annual New England Conference. Pointing out that this area is the center of procurement for many necessary commodities, Mr. Johnson declared:

"In an emergency, we look to you for 70 per cent of our gages, 60 per cent of the early production of small arms ammunition, 40 per cent of our machine guns and 40 per cent of our rifles and pistols. . . . We expect you to produce anti-aircraft and other fire control instruments, cartridge cases, fuses, gun tubes and carriages . . . airplane engines and propellors . . . searchlights. . . . Upon the skill of your workmen and the efficiency of your factories, a heavy responsibility in time of war will devolve."

Carnegie-Illinois to Open New Irvin Works

PITTSBURGH—The new Irvin Works of the Carnegie-Illinois Steel Corp., major project in the modernization program of the U. S. Steel Corp., is to be formally opened Dec. 15. Dedication of the plant, which is named for William A. Irvin, vice-chairman of U. S. Steel, will include an inspection trip by several hundred industrial leaders and corporation executives.

Ground was first broken for the new mill in May, 1937, and nine months later the tin plate division was in full operation. Upon completion, the plant will be operated on a smokeless basis, gas being used throughout, with the exception of two boilers in the power house.

PERSONALS

J. CARLTON WARD, JR., has been elected vice-president and a director of the United Aircraft Corp. and appointed general manager of the Pratt & Whitney Aircraft Division, according to an announcement by DONALD L. BROWN, president of the corporation. Mr. Brown also revealed that H. MANSFIELD HORNER had been named assistant general manager of Pratt & Whitney.

Mr. Ward graduated from Cornell in 1914 and after spending two years in the research engineering field, joined Niles-Bement-Pond as a mechanical engineer. After the war he served in various capacities in that organization's Pratt & Whitney division, leaving in 1926 to become vice-president and general manager of the Hartford Machine Screw Co. After five years as manufacturing executive with the General Cable Co., he returned to Hartford in 1935 as assistant to Mr. Brown, then president of United, and was soon appointed assistant general manager of the engine division, which post he vacates to assume his new responsibilities. Mr. Ward succeeds C. W. DEEDS, who resigned recently to become president of the Chandler-Evans Corp. of Detroit.

Mr. Horner, who takes Mr. Ward's place as assistant general manager, has been identified with the organization since 1926. In recent years he has served as assistant sales manager of the Pratt & Whitney division and also as assistant secretary of United Aircraft, a position he retains in addition to his new duties.

A. W. HERRON, JR., has been appointed manager of warehouse sales for the Jones & Laughlin Steel Corp., Pittsburgh. Mr. Herron has been manager of wire sales since 1935, and prior to that had been district sales manager at Cincinnati for a number of years. He is succeeded as manager of wire sales by J. E. TIMBERLAKE, who started with the company in 1919 and has been in the wire sales department since 1925.

HERBERT J. WINN, president Taylor Instrument Co., has retired to become chairman of the board of directors, it was announced recently. Mr. Winn has been associated with the company for over 45 years, and has served as president and treasurer for 25 years.

LEWIS B. SWIFT, formerly vice-president in charge of engineering and research, will succeed Mr. Winn as president. Mr. Swift joined the organization in 1904, organized and took charge of the sales engineering department in 1919, and became chief engineer in 1929. Since 1934 he has been vice-president in charge of engineering research and design.

Further changes in the Taylor organization include the appointments of KARL H. HUBBARD as chief engineer in charge of engineering research and design and DR. H. L. MASON as head of the research division.

W. L. BROWN, for the past 22 years plants manager York Division, American Chain & Cable Co., has retired from active service. He will continue with the company in a consulting capacity.

FRANK A. FREY has been selected to succeed the late CHARLES W. PAESCHKE as president and treasurer of the Geuder, Paeschke & Frey Co., Milwaukee manufacturer of galvanized products. HENRY F. MILLMAN has been named executive vice-president and general manager.

GUNTHER A. JACOBS has been elected vice-president of the Firth-Sterling Steel Co., McKeesport, Pa. Mr. Jacobs will continue as resident manager in Detroit, making his headquarters at the com-

H. J. WINN

J. E. TIMBERLAKE

L. B. SWIFT

pany's new warehouse and sintered carbide plant in that city.

WALTER JEHU, formerly general manager Timken Roller Bearing Co., Toronto, Ont., has been appointed district manager of the company's Boston office.

A. M. JOHNSON, of the Sundstrand Machine Tool Co. and the American Broach & Machine Co., sailed on the *Queen Mary* Nov. 17. He will spend several months in England and continental Europe and may extend his stay to include a visit to the Leipzig Spring Fair next March.

DUANE E. STEINLE, of the New Britain-Gridley Machine Division of the New Britain Machine Co., New Britain, Conn., has been transferred to Detroit where he will be connected with the company's sales engineering staff.

T. W. LEAVITT has been elected president, treasurer and general manager of the F. E. Satterlee Co., Minneapolis machine tool distributor. Also elected at the recent stockholders' meeting were A. H. SMITH, vice-president, and W. W. SATTERLEE, secretary and sales manager.

BUSINESS ITEMS

The American Society of Tool Engineers recently chartered a student chapter at Fenn College, Cleveland. The branch is the second such student organization set up, a similar chapter having been formed in Detroit some time ago.

The Edward G. Budd Mfg. Co., builders of light-weight transportation equipment, has announced receipt of an order for 250 sets of rudders, stabilizers, elevators and fuel tanks from the Piper Aircraft Corp., Lock Haven, Pa. To be used in the new model J-4 Piper plane, the parts will be fabricated by the company's "Shotweld" process.

Continental Can Co. has acquired property in Oil City, Pa., upon which will be constructed a modern can factory and warehouse.

Columbia Machine Tool Co., according to an announcement by F. B. YINGLING, president, has acquired the Hamilton, Ohio, plant of the Long & Allstatter Co., for the manufacture of additional metal-working equipment.

The Foote Bros. Gear and Machine Corp., Chicago, Ill., has announced the appointment of the Murray-Baker-Frederick Co., Shreveport, La., as district representatives for northern Louisiana and Southern Arkansas.

The Hewitt Rubber Corp., Buffalo manufacturer of industrial rubber supplies, has announced the appointment of the following five new distributors: Joseph Glenn & Sons, Philadelphia, Pa.; Tools & Supplies, Inc., Indianapolis, Ind.; Campbell Hardware & Supply Co., Seattle, Wash.; Laurence Belting Co., New York, N. Y.; Everson Electric Co., Allentown, Pa.

The Jones & Laughlin Steel Corp., Pittsburgh, Pa., has completed its latest unit, the Gilmore Wire Rope Division, at Muncy, Pa. Under the management of ROBERT GILMORE, the new plant is in full operation, manufacturing an extensive line of precision-made wire rope.

The Lockheed Aircraft Corp. will begin construction immediately on a $100,000 final-assembly hangar at its Burbank, Calif. plant.

The Meehanite Metal Corp., Pittsburgh, announces licensing the following companies to manufacture Meehanite metal: Valley Iron Works, St. Paul, Minn.; Barnett Foundry & Machine Co., Newark, N. J.; Herbert Morris, Ltd., Loughboro, England; Douglas Fraser & Sons, Ltd., Arbroath, Scotland.

The National Airship Corp. is building the first unit of an airship factory at Santa Paula, Calif., for the construction of metal semi-rigid tube-type dirigibles. An area 450x250 ft. is being inclosed by a wall 50 ft. high, which will serve as a windbreak for better launching and landing of the blimps.

The Pyramid Metals Co., Chicago manufacturer of decorative moldings, has moved into a new modern factory.

The Chas. A. Strelinger Co., Detroit machinery and supply dealer, has taken on the line of Marquette a.c. arc welders and Chicago Steel & Wire electrodes.

The Union Chain & Mfg. Co., Sandusky, Ohio, manufacturer of materials handling equipment, has appointed C. E. Phillips & Co., Detroit, Mich., as its exclusive sales representative and distributor in the Detroit territory.

The Western Bridge Co., Ltd., Vancouver, B. C., is making application for approval of change of name to Hamilton Bridge, Western, Ltd.

OBITUARIES

HERBERT H. RICE

HERBERT H. RICE, a former vice-president of the General Motors Corp., and former president of the Cadillac Motor Car Co., died of a heart attack Nov. 15 at a hunting lodge near Detroit. He was 68 years of age.

Mr. Rice was born in Providence, R. I., in 1870, and in 1892 received a degree of Bachelor of Arts from Brown University. Immediately after his graduation, he became advertising manager for the Pope Mfg. Co., where he remained for six years. In 1904 he became associated with the Waverly automobile organization at Indianapolis, becoming vice-president four years later. Shortly thereafter he was named president and continued to serve in that capacity for the next eight years. In 1916, Mr. Rice joined the staff of the General Motors Corp. as treasurer. He was made assistant to the president in 1925, which position he held until 1931, when he left the General Motors organization to enter private business. At the time of his death he was president of the Sweet Oil Refining Co.

CHARLES S. DUNDORE, 70, president Dundore Mfg. Co., Reading, Pa., manufacturer of gears and machinery, died Nov. 14 of injuries received in an automobile accident.

HAYDEN EAMES, 74, pioneer automobile manufacturer, died Nov. 24 at his home in Cleveland. In 1895 Mr. Eames helped to organize the Pope Tube Co. in Hartford, Conn., and two years later was instrumental in establishing the motor carriage department of the Pope Co. for the manufacture of the Pope-Hartford car. He was also influential in organizing the Columbia Mfg. Co. of Hartford, maker of electric automobiles.

WALTER S. MOODY, 74, a pioneer in transformer design and in charge of this work for the General Electric Co. from 1892 until 1927 when he was named consulting engineer by the organization, died in Pittsfield, Mass., Nov. 7.

EDWIN S. ROACH, president Penn Brass & Copper Co. and treasurer Bury Compressor Co., both of Erie, Pa., died Nov. 10 in that city following a brief illness. He was 76 years of age.

WILLIAM SPINDLER, production manager Harley-Davidson Motor Co., Milwaukee motorcycle manufacturer, died Nov. 5. He was 48 years of age.

MEETINGS

AMERICAN SOCIETY OF MECHANICAL ENGINEERS. Annual meeting, Engineering Societies Building, New York, N. Y., Dec. 5-9. Society secretary, C. E. Davies, 29 W. 39th St., New York, N. Y.

MOTOR AND EQUIPMENT MANUFACTURERS ASSOCIATION. Annual business meeting, Hotel Blackstone, Chicago, Ill., Dec. 6.

NATIONAL ASSOCIATION OF MANUFACTURERS. Annual meeting of the Congress of American Industry, New York, N. Y., Dec. 5-9.

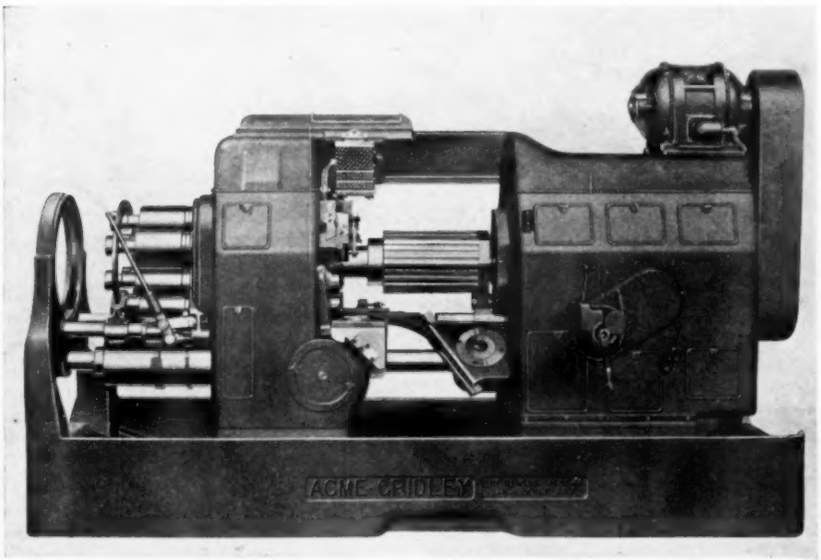
NATIONAL STANDARD PARTS ASSOCIATION. Fifteenth annual convention, Hotel Sherman, Chicago, Ill., Dec. 2-3. Annual show, Dec. 5-10, Chicago.

SOCIETY OF AUTOMOTIVE ENGINEERS. Annual Meeting, Book-Cadillac Hotel, Detroit, Mich., Jan. 9-13.

SHOP EQUIPMENT NEWS

Acme-Gridley Model RA-8 Automatics

The Model RA-8 Acme-Gridley eight spindle automatics announced by the National Acme Co., 170 E. 131st St., Cleveland, Ohio, supplement the new RA-4 and RA-6 bar machines and are offered especially for those classes of production where the availability of eight spindles, as compared with four or six, will result in further production economies. Four normalized high-grade alloy castings make up the solid box-type frame. The spindle carrier, spindles and end tool slides provide for the accurate alignment of tools with the work by mounting the end tool slide around an alloy steel stem which is integral with the spindle carrier. The precision-ground spindles are mounted in anti-friction bearings.



All six side slides move on hardened steel ways, having adjustable gibs. Cam and roll contacts to the slides are short, resulting in direct tool action which is claimed to give freedom from chatter. Each standard slide has an easily adjusted positive stop which engages a hardened stop on the periphery of the spindle carrier to control forming sizes. Each of the two upper side slides adjacent to the fourth and fifth spindle position is independently controlled from its horizontal drum in the top brace. Provision is made for the mounting of two centrally located side slides on the base of the headstock housing adjacent to the third and sixth spindle position. These intermediate slides are each independently controlled. Feed change and spindle speed change gears are interchangeable and are mounted at the motor end of the machine where they are quickly accessible simply by removing a cover.

Hand cranks are located on the front and rear sides of the machine to facilitate tool setting and these are disengaged automatically when the starting clutch is engaged. Control levers and electric switches are located on both sides of the machine for the operator's convenience. Specifications for the $2\frac{5}{8}$-in. machine: maximum capacity of round collets, $2\frac{5}{8}$-in.; maximum length of stock feed, 10 in.; maximum length of turning feed, 8 in.; range of spindle speeds, 101-1160 r.p.m.; size of motor required, 25 hp.; over-all length, including stock reel, $260\frac{7}{8}$ in.; over-all width, 56 in.; net weight, 31,000 lb.

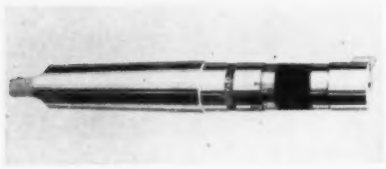
S.C. "Char-Mo" Furnace For Heat-Treating

The controlled atmosphere used in the "Char-Mo" furnace announced by Surface Combustion Corp., Toledo, Ohio, was developed especially for treating molybdenum high speed steel without a protective coating, such as borax. The atmosphere is said to be ideal for treating all types of steels which require a non-oxydizing and non-decarburizing atmosphere for heat-treating.

"Char-Mo" atmosphere is produced from a carbonaceous material which has a high order of reaction, and an oxidizing base gas such as air, in a self-contained generator integral with the furnace. Essentially, it is a mixture of balanced carbon oxides, largely diluted with inert nitrogen. The "Char-Mo" furnace is offered in two types, a horizontal muffle type and a vertical muffle type, in temperature ranges of 1400–1850 F. and 2000–2400 F.

Eclipse "MikrO-Lok" Adjustable Tools

"MikrO-Lok" adjustable-blade boring tools announced by the Eclipse Counterbore Co., 7410 St. Aubin Ave., Detroit, Mich., are equipped with self-locking blades which adjust "like a micrometer". Jig boring tools

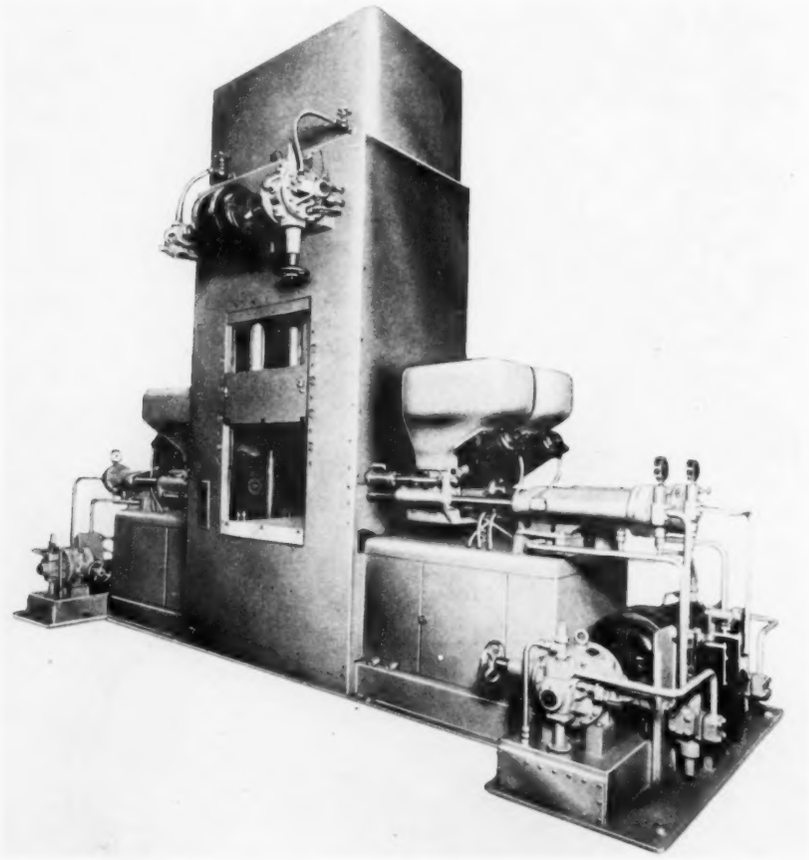


of this type are available in sizes for boring holes from ¾ to 4 in. in diameter, and high speed precision boring tools for diamond boring machines are made for hole sizes as small as 0.500 in. All of these tools are adjustable in increments of 0.00025 in. Two-bladed fixed type and floating-blade boring bars, automatic feed-out type tools for recessing and undercutting, and bars having piloting sections both above and below the work also are available equipped with "MikrO-Lok" adjustment. These tools were developed by W. K. Young, manager of the Boring Bar Division.

H-P-M Model 500 "Hydro-Power" Injection Molder

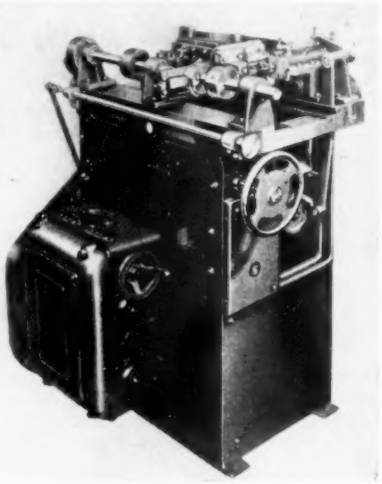
The Model 500 "Hydro-Power" injection molding press announced by the Hydraulic Press Mfg. Co., Mt. Gilead, Ohio, is of the vertical downward acting mold clamp type which follows the basic principles of its predecessor, the Model 100 machine previously described (*A M*—Vol. 82, page 391). However, this larger unit incorporates two 8 oz. capacity injection units mounted on each side, giving the press a total of 32 oz. injection capacity per shot. The power unit for operating the clamp is mounted overhead on the back of the frame. The surge tank containing the operating oil also is mounted overhead controls are conveniently arranged for quick operation.

Auxiliary reservoirs, connected with the surge tank, are provided under each injection unit. Separate power units for each injection unit are mounted on these auxiliary reservoirs just back of the injection cylinder supports. A hydraulic ejector is built into the base of the clamp. The "Hydro-Power Fastraverse" system of operation employed in connection with this press is the same as that used in other "Fastraverse" presses offered by this company.



Torrington Type W-30 Torsion Spring Winder

Designed to produce small torsion springs with complicated end forms on either or both ends, the Type W-30 torsion spring winder announced by The Torrington Mfg. Co., Torrington, Conn., features a horizontally mounted spindle to facilitate the adjustment of forming tools. Either slide or roll feed can be provided for the wire and several types of forming slides can be interchangeably mounted on either or both sides of the winding mandrel. The line includes machines in three sizes covering a range from 0.008 to 0.135 in. diameter wire.



Acme Six-Spindle High-Speed Tapper

A six-spindle, semi-automatic coupling tapper equipped with automatically air-operated chucks has been announced by the Acme Machine Co., 4533 St. Clair Ave., Cleveland, Ohio. Scroll air chucks are closed and opened automatically with the vertical movement of the spindle. In operation, the coupling is placed in the chuck and

then the operator trips a lever at the right of the spindle. The spindle then completes its cycle, and returns with the coupling on the tap shank.

The spindles of this machine are provided with oil checked valves and with a small bleeder valve which makes it possible to cushion the spindle to the desired amount on its downward stroke. Production is at the rate of 1,250 couplings per hour when working on the ¾-in. size. Machine has a work capacity range from ⅛ to 1¼ in. standard pipe couplings.

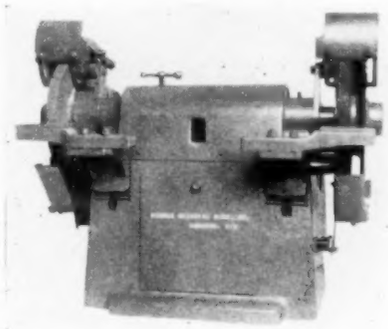
G-R Model 20 Welder

The Glenn-Roberts Co., 1009 Fruitvale Ave., Oakland, Calif., offers the Model 20 a.c. arc welder of close-coupled transformer design in which the welding circuit voltages never exceed 70 volts. This welder is rated 25

amp. at 240 volts and 1.25 amp. at 480 volts. Output ranges from 15 to 160 amp. with 70 volts open circuit and 20–30 volts when welding. The unit is 33 in. high, 18 in. wide, and 18 in. deep. Net weight is 242 lb.

Ransom Type D Heavy-Duty Grinder

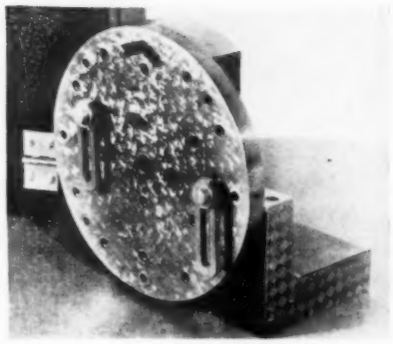
The Type D floor-type grinder, offered by Ransom Grinding Machine Co., 320–326 Eighth St., Oshkosh, Wis., is arranged for 24-in. diameter vitrified wheels. Driven by a 5 or 7½ hp. totally-inclosed ball bearing motor, this grinder incorporates a speed changing unit with Texrope drive and is designed to maintain a constant peripheral speed of 6,400 ft. per min. Wheels may be worn down to 12-in. diameter and still maintain this speed. Distance between wheels is 52 in. and length of machine, over guards, is 67 in. Height of spindle above floor is 36 in. Net weight, 3,200 lb.



"Pesco" Index Master

Measurements can be checked to 0.00005 in. with the "Pesco Index Master" developed by the Pump Engineering Service Corp., 12910 Taft Ave., Cleveland, Ohio, for use by their engineers and now made available to the metral working industry. This unit combines an index, layout and inspection fixture with which angles can be checked with gage blocks quickly and accurately.

The fixture consists of an angle iron with a hardened bushing fitted in the exact center. On each side the angle iron are steps where hardened guide plates are fastened. These plates are parallel to both the center bushing and the base of the angle iron. At the top of the angle iron another bushing is used for indexing.

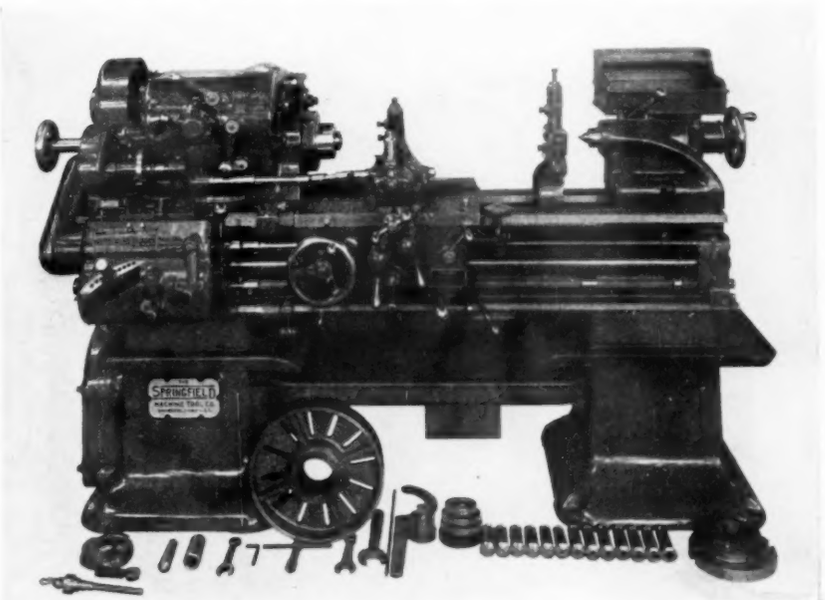


The vertical index plate can be clamped in any position and its outside rim is graduated in degrees. Eight index holes, with hardened, ground and lapped bushings, are located 45 deg. apart, the index pin inserted in any one of these bushings brings the plate into exact 45 deg. angular position. When it is necessary to plot any angle other than 45 deg. or its multiple, measuring blocks are placed on either guide plate.

Springfield Offers Metric Lathe

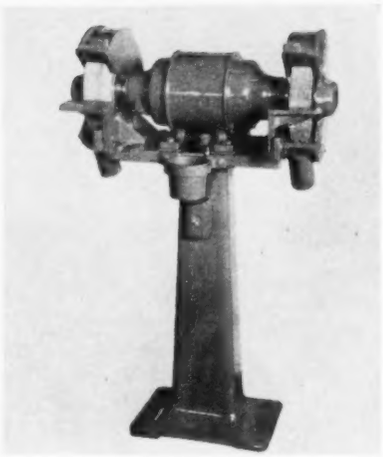
The Springfield Machine Tool Co., 631 W. Southern Ave., Springfield, Ohio, has announced a ball-bearing, geared-head toolroom lathe equipped to produce screws to metric measurements. The head provides twelve changes of speed and the spindle is equipped with precision taper roller bearings. The lathe has a relieving attachment, taper attachment, draw-in collet attachment, and oil pan.

Of particular interest on this lathe



is the thread chasing dial which indicates to the operator the proper time to close the half nuts to produce the metric threads listed on a chart accompanying the lathe. A separate dial is provided for each group of threads listed. These dials are interchangeable on the shaft of the thread-chasing indicator and the mechanism can be dropped out of engagement when not in use. Eight dials cover a full range of metric threads from 0.2 to 18 mm.

Standard "Cadet" Pedestal Grinder



The "Cadet" 12-in. ball bearing pedestal grinder developed by The Standard Electrical Tool Co., 1940 West Eighth St., Cincinnati, Ohio, has capacity for 12-in. diameter by 2-in. face grinding wheels. Wheel guards are of the safety type and are adjustable for wheel wear. Distance between wheels is 20 in. and height of the center of the spindle above the floor is 40 in. Net weight, without wheels is 328 lb.

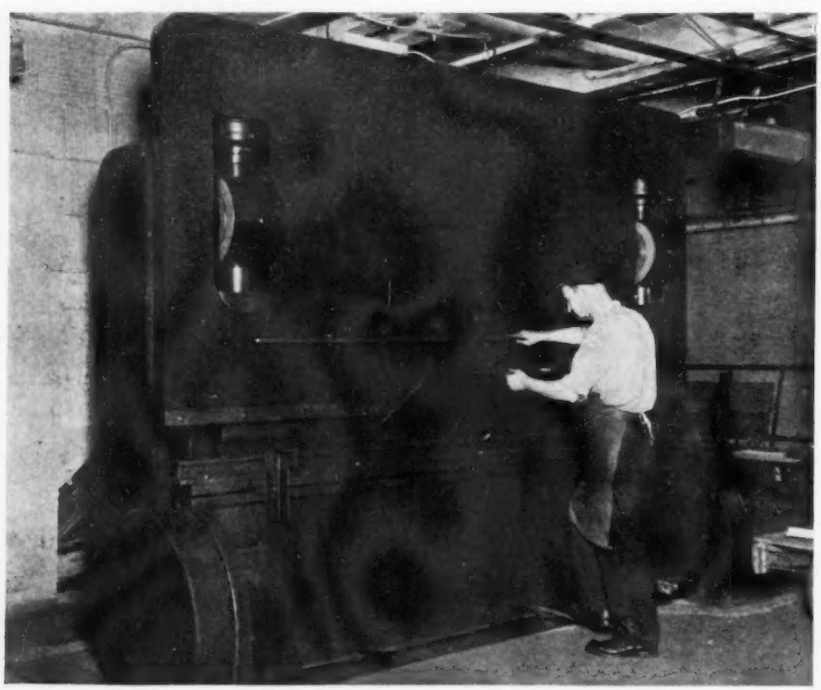
Logan Remote-Control Air Operating System

Simplified control of air-operated equipment is claimed for the "Logan" remote air-operating system developed by Logansport Machine, Inc., 906 N. Market St., Logansport, Ind. This system permits operation of devices from conveniently located stations and is suitable for practically any kind of manual, semi-automatic, automatic, inter-locking or sequence control of one or more cylinders. Master control valves, similar to the Model 6245 valve shown, are installed close to the cylinder and are operated either by direct-connected bleeder valves, pressure operated bleeders, solenoid bleeders, or a combination of these types.

Ferracute Offers "Rafter" Press Brakes

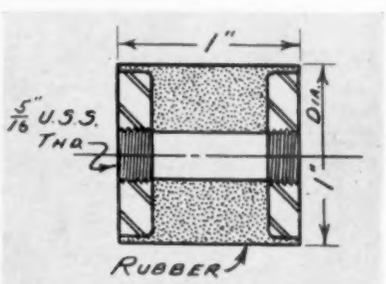
Manufacturing rights for the "Rafter" steel press brake have been acquired by the Ferracute Machine Co., Bridgeton, N. J., and these machines will be marketed by the Bryant Machinery & Engineering Co., 400 W. Madison St., Chicago, Ill. These brakes employ an improved design in which the ram is pulled downward into the work, power being applied from below the dies.

The "Rafter" brake consists primarily of two major members, the ram and the bed. The bed member and end frames, welded together, with the attached gearing, connecting rods and drive mechanism comprise a deep unit designed to resist deflection. The bed is a deep section of thick rolled-steel plate. The only mechanism carried on the ram is the self-contained ram adjusting device. Nine standard units are available, with a clear width between housings ranging from 78 to 150 in. and an overall length of die of 97½ to 178 in.



Goodrich Type 40 Adjustable Mountings

The Type 40 Vibro-Insulator announced by the B. F. Goodrich Co., Akron, Ohio, provides adjustable deflection so that either soft or stiff type mountings can be secured. This adjustable feature is made possible through the construction, which consists of rubber vulcanized to two parallel drilled and tapped metal disks. The hole extends through the



entire length of the mounting. Deflection is varied by the use of attaching screws of different lengths. When these screws penetrate nearly to the center of the mounting, a relatively

"Just What We Wanted"

say these men about the New "Buffalo" No. 16 Power Feed DRILL

TOOL ENGINEER—"A well designed drill, if we ever saw one!"

PRODUCTION ENGINEER—"The smoothest production flow we have ever had from our drills."

FOREMAN—"Our operators take to it like ducks to water."

OPERATOR—"The best drill in the shop. Easy to operate, better work."

Here's why:

—Positive gear drive.

—Positive clutch type power feed.

—No belts, no friction members to get out of order.

—Easy-to-read depth dial.

—No adjustments required.

—Feed change may be made while machine is running.

We have just prepared a new bulletin No. 3122 on this fine power feed drill. Why not send for it now?

BUFFALO FORGE COMPANY

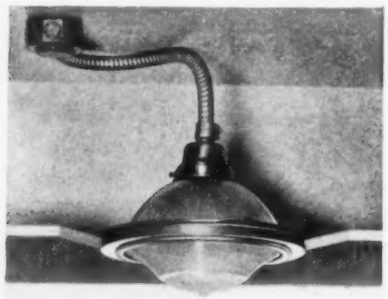
448 Broadway Buffalo, N. Y.

Branch Engineering Offices in Principal Cities. In Canada: Canadian Blower & Forge Co., Ltd., Kitchener, Ont.

stiff small deflection mounting is secured. The full cushioning value is utilized by attaching the insulator with short screws.

Holophone "In-Bilt" Reflector-Refractor

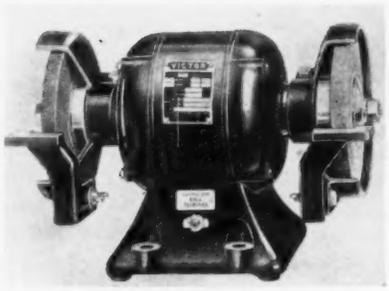
Wide light coverage is claimed for "In-Bilt" recessed reflector-refractors developed by Holophane Co., Inc., 342 Madison Ave., New York, N. Y. These units are specially suited for



low ceiling installations, since at normal spacings they afford adequate, even light coverage. There is a range of sizes accommodating 100 to 300 watt lamps.

"Superior" Mezzanine Storage Floor Mesh

Increasing storage capacity without increase of floor space is possible with the mezzanine storage floor mesh units offered by Superior Wire and Iron Products, 1051 E. 76th St., Chicago, Ill. Mesh is of self-interlocking construction and presents a flush surface. It is supported on channel frames and carries 70 lb. per sq. ft.



Stanley "Victor" No. 66 Bench Grinder

The No. 66 "Victor" bench grinder offered by Stanley Electric Tool Div., The Stanley Works, New Britain, Conn., is powered by a ¼-hp. ball-bearing motor and takes 6-in. diameter wheels. This bench unit is suited for general grinding, tool sharpening, buffing, polishing and wire brush operations. It is equipped with wheel guards, tool rests, and a toggle-type switch.

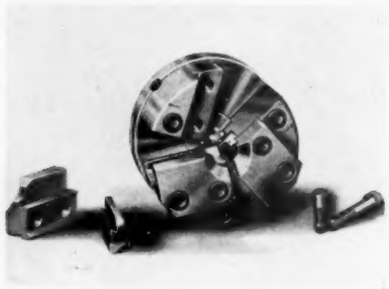
"Packless" Improved Vibration Absorbers

Flexible, one-piece vibration absorbers offered by Packless Metal Products Corp., Long Island City, N. Y., for preventing pipe breakage, leak-proofing, deadening noise and eliminating vibration in pipe lines, are made from

seamless bronze tubing drawn into a helical flexible tube by a process that is claimed to permit the use of tubing of extra wall thickness and strength without sacrificing flexibility. Bronze braid casing is double-clamped by means of a metal ring and a soldered ferrule. Fourteen standard sizes range from ¼ to 6 in. inside diameter.

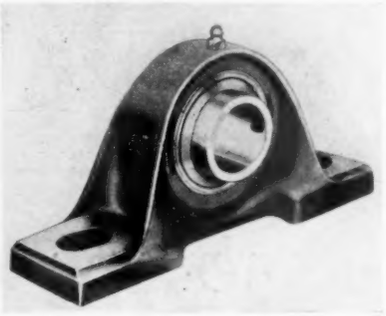
Landis Forming Head

A special forming head for use on automatic forming and threading machines has been developed by the Landis Machine Co., Inc., Waynesboro, Pa. In addition to facing and beveling the end of the work, the cutters used are designed to reduce the body diameter of the work and face the shoulder at the end of the cut. In order to reduce the strain on the head, the cutting load is distributed over three cutters, which are located and lodged in the correct cutting position by a setting gage and clamping action similar to that employed for the Landis tangential chaser.



S-A "Sealmaster" Pillow Blocks

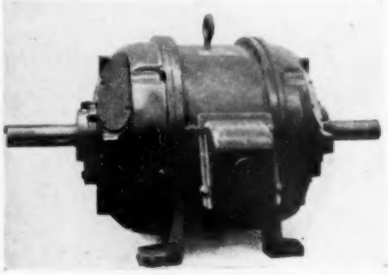
A positive, centrifugal sealing principal consisting of two inner and two outer steel seals is incorporated in the "Sealmaster" ball bearing, self-aligning pillow blocks offered by Stephens-Adamson Mfg. Co., Aurora, Ill. Inner seals, one at each side of the



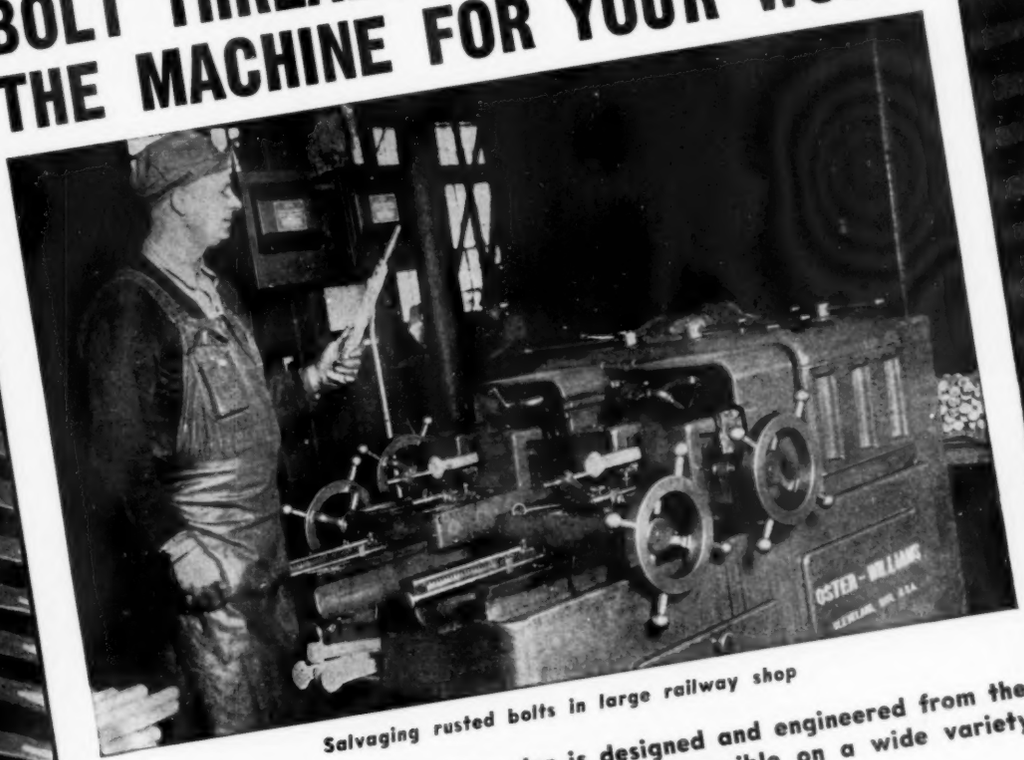
bearing, are pressed into outer ring, and become permanent parts of the bearing, forming tight grease chambers for race grooves and rolling elements. External flinger seals are pressed into position on lands of the inner race ring.

Westinghouse Offers Type CS Hoist Motors

Designed for severe intermittent service where frequent starts, stops and reversals are encountered, the Type



BOLT THREADING? . . . HERE'S THE MACHINE FOR YOUR WORK



Salvaging rusted bolts in large railway shop

The "RAPIDUCTION" Bolt Threader is designed and engineered from the base up to give you the best performance possible on a wide variety of work.

Built in two sizes, 3/8" to 1 1/2" and 1/2" to 2 1/4", in both single and double spindle models, the "RAPIDUCTION" handles not only standard jobs but, because vise and carriage are free from obstructions, is adaptable to the application of special fixtures for holding unusual jobs of many kinds.

Write today for complete information and specifications.

THE OSTER MANUFACTURING COMPANY

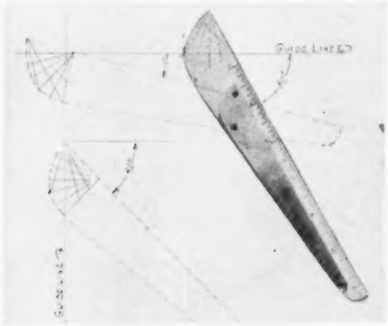
Sales office: 2049 East 61st Street, Cleveland, Ohio
Factories: Erie, Penna., and Cleveland, Ohio
New York City Showroom and Office, 292 Lafayette St.
Philadelphia Showroom and Office, 111 No. 3rd St.
Threading Headquarters Since 1893

OSTER
THREADING EQUIPMENT
WILLIAMS

CS hoist motors announced by Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa., are said to provide the highest ratio of starting torque to starting current obtainable with a squirrel-cage motor. They cause minimum disturbance to the line and permit the use of a full voltage starter.

Wright "U-Draft" Pocket Instrument

The "U-draft" combination drafting instrument developed by L. G. Wright, Inc., 5209-4 Euclid Ave., Cleveland, Ohio, combines a T-square, traingles and drafting scales in a pocket instrument. It is 7½ in.



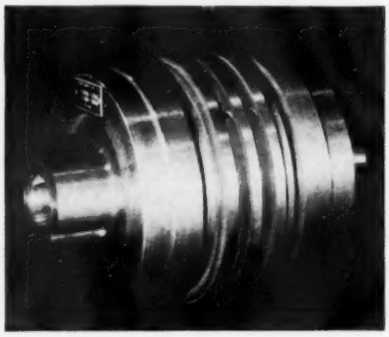
long and 1¼ in. wide. The instrument is made of pyroxlin and the scales are engine divided. A metal stiffener is eyeleted to the pyroxlin to keep the instrument flat. It is supplied in four different graduations.

Delta Dust-Cabinet For Tool Grinders

A self-contained dust-removal cabinet has been developed by Delta Mfg. Co., 620 E. Vienna Ave., Milwaukee, Wis., for mounting on any Delta pedestal grinder. The cabinet contains dust filters and baffles to trap the dust and heavy particles carried down the discharge chutes of the grinder. The unit requires no power.

"Feed As You Need" Adjustable Chuck

"Feed As You Need" chucks announced by Scully-Jones & Co., 1901-1913 S. Rockwell St., Chicago, Ill., have a positive forward adjustment, allowing the operator to use any part of the full length of the drill. These chucks will drive all straight shank drills, whether whole or broken. With the proper combination, this chuck will drill, counterbore and spot-face for any given depth. Adjustment is secured by pulling the collar down and turning it forward or backward. Eight sizes are available.

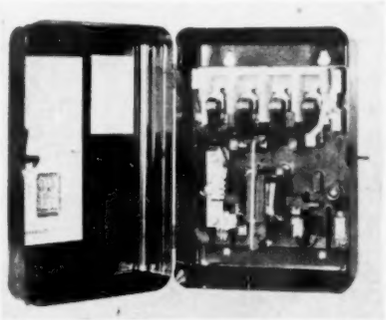


Stearns Style ED Magnetic Disk Clutch

The Style ED multiple-disk duplex magnetic clutch announced by the Stearns Magnetic Mfg. Co., Milwaukee, Wis., can be used for a variety of applications, such as carriage and rapid traverse operations, tool slide feeds, spindle and other requirements where the clutch must have flexibility and positive control. This clutch is designed to operate both clutches with a single magnet.

G.E. Magnetic Starter

A magnetic switch available in ratings of 3 hp. at 110 volts, 5 hp. at 220 volts and 7½ hp. at 440 volts, has been developed by General Electric Co., Schenectady, N. Y., for use with single-phase motors. This switch consists of a standard general-purpose four pole magnetic switch with two poles connected in parallel. Its application is limited to use with single-phase motors whose normal full-load current does not exceed 30 amp.



"Lima" Gearshift Motor-Drive Unit

Developed for use in converting cone-type lathes to motor-drive, the "Gearshift" motor announced by the Lima Armature Works, Inc., 438–440 N. Main St., Lima, Ohio, is available in seven capacities ranging from 1 to 10 hp. Each size is available with a single-speed, 1200 r.p.m. motor or with a two-speed 1200/600 r.p.m. motor drive. The four-speed automotive-type transmission used provides three speeds forward and one reverse.

W. E. & M. Co. Offers "Flexarc" Welding Cable

A "Flexarc" welding cable that is flexible, durable, and light in weight has been announced by Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa. This cable is applicable for field and shop use and complies in all respects with the latest I.P.C.E.A. specifications for rubber sheathed arc-welding cables. The paper separator between the copper and rubber

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The above photograph shows the six different sizes of Boston Gear standard Ratiomotors — 54 various output speeds in 8 power sizes ranging from 1/20 to 3 horsepower — always in stock ready for your immediate use. Our general catalog #52 contains complete specifications and list prices of all these units, so if you order any Ratiomotor listed in this publication you know you will save time — because it will be in stock ready to be on its way to you.

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sheathing permits sliding action between the outside layer of wires and the rubber jacket. The protective jackets are of 60 per cent rubber.

Mahoning "Spatter-Nox"

When brushed or sprayed over the welding area before welding is started, "Spatter-Nox" offered by the Mahoning Paint & Oil Co., Youngstown, Ohio, is claimed to reduce arc welding spatter and to increase welding speed by permitting a more stable arc. If coated electrodes are used, this material is claimed to reduce slag cleaning time by 50 per cent.

TRADE PUBLICATIONS

ABRASIVE CLEANING Book No. 212, published by the American Foundry Equipment Co., 999 S. Byrkit St., Mishawaka, Ind., describes the "Wheelabrator Tum Blast" line of airless abrasive blasting equipment.

BAND SAW Price list No. 14, published by the W. O. Barnes Co., 1297 Terminal Ave., Detroit, Mich., lists recommendations and prices on several types of metal-cutting saws.

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Special Alloy Steel Service Helps User Quickly Secure Desired Results

Ryerson certifies to the known uniform high quality of all steels in stock—from the thinnest sheet to the heaviest plate—from the smallest bar to the largest beam. In addition, we have developed a special alloy steel service that is a big help in securing desired heat treatment results. Whole heats of ideal close range analyses are selected for each S.A.E. number; special data sheets showing chemical and physical properties, grain size, cleanliness rating and actual results of heat treatment tests, are sent with every shipment of Ryerson Certified Alloy Steels. This complete information makes guessing or testing unnecessary. The heat treater knows the characteristics of the steel. He does not take chances and he gets better results in less time. There are many other advantages. Let us tell you the complete story. Write for booklet.

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AIR CONTROL Bulletin No. 370 offered by Logansport Machine, Inc., 906 N. Market St., Logansport, Ind., gives full descriptions and specifications of valve units used in the "Logan" remote air-operating systems.

ALLOY CASTINGS Michiana Products Corp., Michigan City, Ind., has published Booklet No. 108-5M, which gives data-concerning stainless steel heat-resisting alloy castings.

ABRASIVE CUTTING A line of abrasive cutting machines is described in Circular No. DH-1089, published by the Andrew C. Campbell Div., American Chain & Cable Co., Bridgeport, Conn.

BEAD CHAIN A leaflet illustrating a line of bead chains has been released by The Bead Chain Mfg. Co., Bridgeport, Conn.

BEARINGS A pamphlet now being by the Federal-Mogul Corp., Detroit, Mich., describes a line of bearings, bushings and bearing metals for industrial applications.

BEARINGS Catalog No. 106, made available by the Nice Ball Bearing Co., Philadelphia, Pa., contains 64 pages of specifications and engineering data concerning a line of ball bearings.

BEARINGS Folder No. 103, now being distributed by the Nice Ball Bearing Co., Nicetown, Philadelphia, Pa., discusses a line of ball bearings.

CASE-HARDENING SALT Technical Bulletin No. A-9113, released by the R. & H. Chemicals Dept., E. I. du Pont de Nemours & Co., Wilmington, Del., describes an accelerated salt for the production of mixed carbon-nitrogen cases on plain carbon and alloy carburizing steels.

CLAD STEEL A revised edition of Bulletin No. T-4, entitled "Methods for the Fabrication of Lukens Nickel-Clad Steel" is now being distributed by the Lukens Steel Co., Coatesville, Pa.

CLUTCHES Bulletin No. 225 offered by the Stearns Magnetic Mfg. Co., Milwaukee, Wis., discusses the features of high-duty magnetic clutches and combination clutch-brakes.

CUTTING FLUIDS Folder No. 2-80, issued by E. F. Houghton & Co., Philadelphia, Pa., describes the "Cut-Max" line of straight cutting oils and bases.

COMMERCIAL FORMS The Division of Simplified Practice of the National Bureau of Standards has made available copies of its Simplified Commercial Form Recommendation. Officially indexed as "Simplified Practice Recommendation R-37-38," copies of the recommendation may

be obtained from the Superintendent of Documents, Government Printing Office, Washington, D. C. Price, 10 cents each.

CUTTING FLUIDS The Tide Water Associated Oil Co., 17 Battery Place, New York, N. Y., has published a 16-page illustrated bulletin containing data concerning several types of cutting fluids.

DIE METAL "Hobalite" steel for mold dies is described in a leaflet released by the Ziv Steel & Wire Co., 2945 W. Harrison St., Chicago, Ill.

DIE CASTINGS The New Jersey Zinc Co., 160 Front St., New York, N. Y., has made available two pamphlets entitled "Zinc Alloy Die Castings in Hardware" and "Zinc Alloy Die Castings in Industrial Equipment".

DUPLICATING UNIT A folder issued by the Universal High Speed Tool Co., 549 W. Washington Blvd., Chicago, Ill., describes the Model 4-HA Eklind "Hydra-Speed" contour duplicating unit.

ELECTRIC FURNACES C. I. Hayes, Inc., 129 Baker St., Providence, R. I. has published Bulletin No. A-101, which discusses the features of "Certain Curtain" controlled-atmosphere electric furnaces.

"GASFLUX" A circular now being distributed by the Automatic Gasflux Co., 620 Frankfort Ave., Cleveland, Ohio, describes the "Gasflux" system of production welding.

GEARMOTOR Bulletin No. MR 38, published by the Philadelphia Gear Works, G St. and Erie Ave., Philadelphia, Pa., contains 40 pages of data on several types of "MotoReduceRs."

HACK SAW BLADES Price lists Nos. 13 and 15, issued by the W. O. Barnes Co., 1297 Terminal Ave., Detroit, Mich., include prices on hand and power hack saw blades.

HARDNESS TESTERS A leaflet issued by the Steel City Testing Laboratory, 8843 Livernois Ave., Detroit, Mich., describes features of the BV-100 hardness tester.

METALLIC FINISHING The Hilo Varnish Corp., 42-60 Stewart Ave., Brooklyn, N. Y., has issued a leaflet containing samples of the "Hilo Metallic Rip-Pl" one-coat finishes.

MILLING ATTACHMENTS The "Eklind" line of universal milling, drilling and boring attachments is described in a folder released by the Universal High Speed Tool Co., 549 W. Washington Blvd., Chicago, Ill.

PILLOW BLOCKS Catalog No. 7538, offered by the Bearing Division, Stephens-Adamson Mfg. Co., Aurora, Ill., discusses features of the "Sealmaster" self-aligning, ball bearing pillow blocks recently announced.

PACKING A line of leather packings is described in a booklet released by Alexander Bros., 406 N. 3rd St., Philadelphia, Pa.

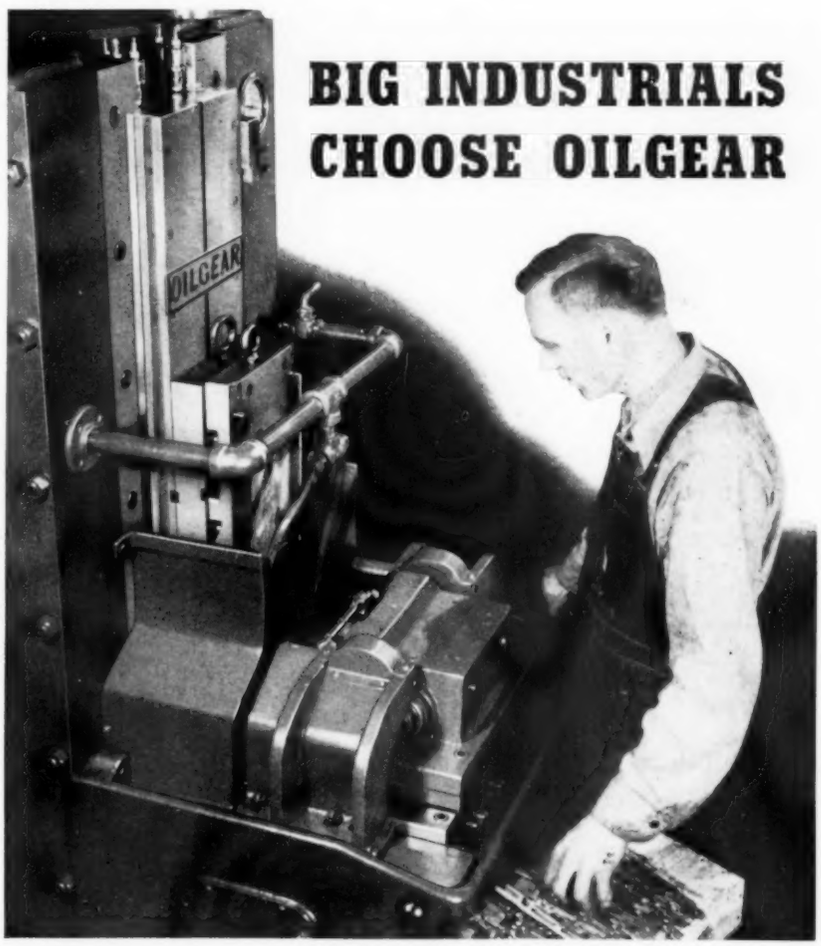
PLASTICS A pamphlet now being distributed by the Celluloid Corp., 10 E. 40th St., New York, N. Y., describes properties and uses of several types of plastics.

REFRACTORIES Bulletin No. 327-C, now being distributed by the Quigley Co., 56 W. 45th St., New York, N. Y., discusses the properties of "Insulag" refractory lagging.

PLATING A leaflet issued by the Bright Nickel Corp., Detroit, Mich., outlines the bright nickel plating process.

SAFETY A bulletin released by the Underwriters' Laboratories, Inc., 207 E. Ohio St., Chicago, Ill., lists inspected appliances relating to accident hazards.

SAW A metal-cutting band saw is illustrated in a folder issued by the Wells Mfg. Corp., Three Rivers, Michigan.



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BROACHING MACHINES AND PRESSES

SHEET STEEL The American Rolling Mill Co., Middletown, Ohio, has published a 32-page booklet describing the "Armco" line of electrical sheet steel.

SPRING COILING A folder now being distributed by Sleeper & Hartley, Inc., Worcester, Mass., describes the No. 1 universal segment-type spring coiler.

SPRING FORMING A torsion spring-winding machine is described in a folder released by the Torrington Mfg. Co., 56 Field St., Torrington, Conn.

STAMPINGS The Dayton Rogers Mfg. Co., 2830 S. 13th Ave., Minneapolis, Minn., has made available a folder discussing a small-lot metal stamping service.

STEEL STAMPS A folder issued by the M. E. Cunningham Co., 115 E. Carson St., Pittsburgh, Pa., describes a line of "safety" steel stamps.

TRACTOR Features of the "Caterpillar" diesel D4 tractor are set forth in a 32-page illustrated booklet, Form No. 4870, now being distributed by the Caterpillar Tractor Co., Peoria, Ill.

TRANSMISSION The Lenney Machine & Mfg. Co., Warren, Ohio, has released a catalog describing an infinitely variable speed transmission.

SURFACE GRINDER A bulletin offered by Thornton Mechanical Laboratory, 251 Whiting St., New Britain, Conn., describes the features of a 12-in. bench type precision surface grinder.

VACUUM CLEANER A line of heavy-duty portable industrial vacuum cleaners is described in Booklet No. A-303, issued by the Air Appliance Div., United States Hoffman Machinery Corp., 105 Fourth Ave., New York, N. Y.

NEW LUFKIN RADIUS GAGES

With Radii from 9-16" to 1" by 16ths

To meet the demand for radius gages with radii larger than ½", this new large size Lufkin set is now offered with radii up to 1". Like all Lufkin Radius Gages, each blade is a separate unit, prominently marked with its individual radius, and carrying five applications of the internal and external forms. A sturdy leatherette folder is furnished with every set.

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TAPES — RULES — PRECISION TOOLS

NEW BOOKS

FORGING PRACTICE.—*By Carl G. Johnson, assistant professor of mechanical engineering, Worcester Polytechnic Institute.* 136 *pages,* 5½ x 8¼ *in. Clothboard binding. Indexed and illustrated. Published by American Technical Society, Drexel Ave. at* 58*th St., Chicago, Ill. Price,* $1.50.

Offered as a practical "how-to-do-it" book dealing with hand-forging of wrought iron, machine steel and tool steel; drop forging; and heat-treatment of steel, this volume is profusely illustrated with line drawings and photographs showing various steps in hand and power forging operations. The fundamentals of these operations are discussed in detail.

•

STEEL AND ITS HEAT-TREATMENT, FOURTH EDITION—*By E. K. Bullens and the Metallurgical Staff of the Battelle Memorial Institute.* 445 *pages,* 5¾ x 9 *in. Clothboard binding. Indexed and illustrated. Published by John Wiley & Sons,* 440 *Fourth Ave., New York, N. Y. Price* $4.00.

So fast and so far has the technique of steel treating traveled in the past ten years that books on the subject need frequent revision if their content is to be timely and correct. Ten years ago controlled atmospheres were practically unheard of, although it was known that a "rich" fuel mixture in the furnace would help prevent scaling. The high tensile low-alloy steels had yet to come into popularity. New furnace materials combining insulating with refractory properties had yet to be developed. Gas-fired radiant tubes, as furnace heating elements, were then unknown. In short, many of the facts that make steel and its treatment conform to modern requirements are new.

The rewriting of Bullens' classic volume by the staff of the Battelle Memorial Institute brings a well-known work on steel up to the minute in technical practice. Despite the deletion of old material it was found that the original single volume had grown to two. Volume I which is now available relates to the heat-treatment of steel in general. Volume II will discuss engineering carbon steels, simple alloys, complex alloys and special purpose steels.

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PRACTICAL MATHEMATICS FOR TOOLMAKERS AND MACHINISTS.—*By Charles Edward Bollenbacher,* 78 *pages,* 6 x 9 *in. Paper binding, indexed and illustrated. Published by Bollenbacher & Ford,* 31 *Benedict Ave., Norwalk, Ohio. Price,* $1.00.

Compiled to give the machinist and toolmaker practical formulas in condensed form to enable him to calculate quickly and accurately problems that occur in ordinary machine shop practice, this book offers short cuts and methods applicable to the machine tool industry. Formulas most commonly employed are reviewed and explanations are given for many formulas which may be found in other hand books. A number of *American Machinists* reference book sheets are included.

SEEN AND HEARD

JOHN R. GODFREY

Goldbergs That Pay

Responsibility for results in small shops, where production volume and cash are both limited, keeps a man guessing. It also develops him in a way that helps him meet emergencies as they arise, and to devise ways that enable him to turn out work at a profit. While some of his devices may put him in the Rube Goldberg class in the eyes of some, they are frequently efficient enough to make it impossible for high class designers of special machines to do the job at lower net costs.

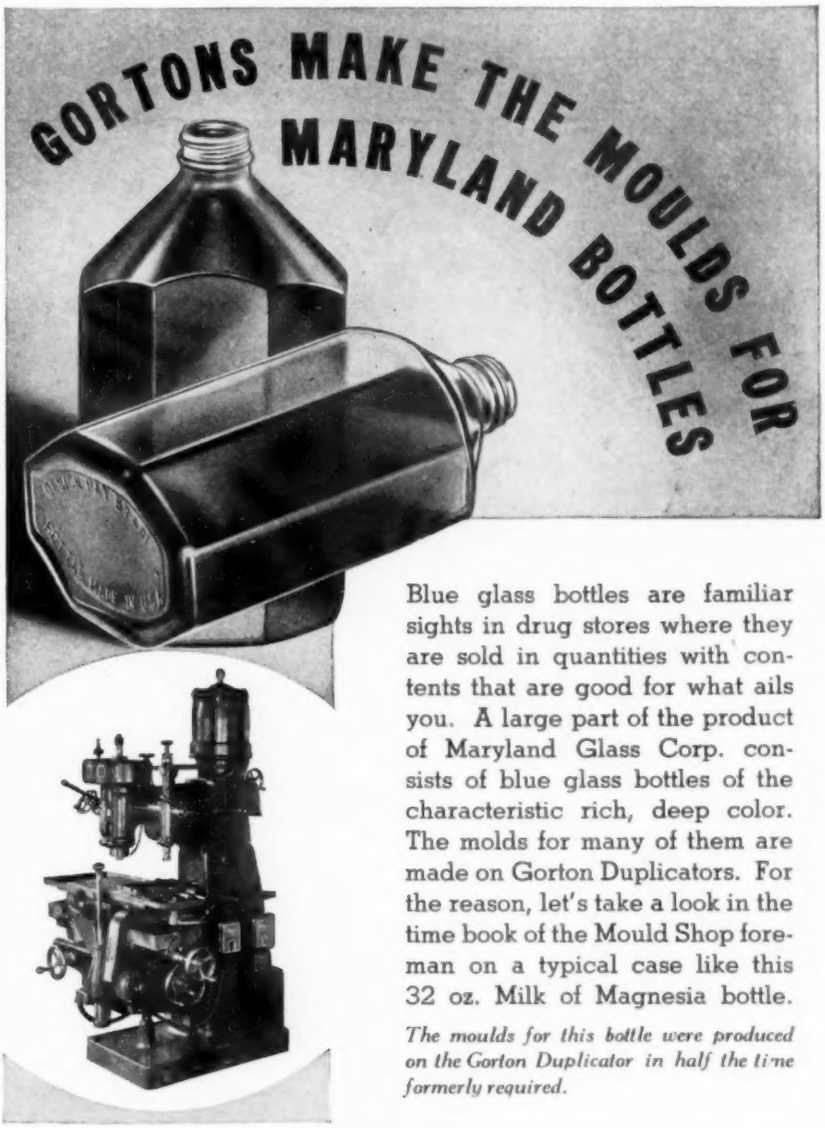
Two instances came to mind—one in the old Gillette razor plant. Some bright chap, in the days when this plant was small, rigged up a cheap bench lathe to turn the handles. A friend, who was a shark at special tooling of automatics, wanted to sell them a new machine. But after studying their costs he could not justify the buying of one of his machines.

I ran across a similar case in Texas not long ago. This was a job of making a special coupling for flexible hose. The foreman rigged a gadget on an old engine lathe that did the trick. But he wanted something better, so he consulted another specialist in automatics. After telling him it couldn't be done, they figured that for about $8,000 they could build a machine that would do them *some* faster than the old engine lathe. But not by any means enough to justify the expense of the lathe.

With a large enough production, it is probably economical to design and build special machines for the product. But the ingenious foreman in the small shop can often make it mighty hard for the automatic to make any kind of an economical showing.

Automobile Service Makes Work

Few of us fully realize the extent to which the automobile has created a demand for tools used only in service stations, until we travel in thinly populated districts and in non-industrial countries. I have been impressed with this both in Mexico and in the southwest of the United States. In small shops that one tucked away in



Blue glass bottles are familiar sights in drug stores where they are sold in quantities with contents that are good for what ails you. A large part of the product of Maryland Glass Corp. consists of blue glass bottles of the characteristic rich, deep color. The molds for many of them are made on Gorton Duplicators. For the reason, let's take a look in the time book of the Mould Shop foreman on a typical case like this 32 oz. Milk of Magnesia bottle.

The moulds for this bottle were produced on the Gorton Duplicator in half the time formerly required.

	Produced on a Gorton Duplicator			By Previous Methods	Time Saved
	Duplicator Time	Hand Work	Total		
Bottle Moulds, 9 halves	28 hrs.	87 hrs.	115 hrs.	182 hrs.	67 hrs.
Bottom Plates, 4	4	12	16	27	11
Blanks, 9 halves	14	21	35	122	87
Total Time	46 hrs.	120 hrs.	166 hrs.	331 hrs.	165 hrs.

GEORGE GORTON MACHINE CO.
1103 13TH ST., RACINE, WIS.

what was once the front room of a fashionable dwelling, there are now such special machines as Van Norman cylinder boring and piston turners and grinders, Van Dorn valve grinders and others that have been designed and built especially for the repairing of automobiles, trucks and buses.

Gasoline pumps and equipment for keeping air pressure in tires alone run into much money while battery repair and charging equipment, generators and instruments also form part of the necessary installation of every well appointed service station. The demands for equipment of this kind must play an appreciable part in the business of the country and add greatly to the demand for machines and for men to operate them.

TO THE EDITOR

Above Average

Dear Sir:

After having read your article on Bill Smith, I have some remarks to make. The conditions you set forth may be applied to men having a trade or some specialist and piece-work job, but in no sense apply to the average man. Therefore, your article can only apply to about 20 per cent of the working classes.

I don't believe that any government agencies ever said that the average wage was $1600. Your article seemed to imply that such was the case.

Yours for more facts,

F. W. Childs

American Machinist did not say that government figures show the average worker gets $1600 a year. However, this is in line with the average income of workers in the automobile and steel industries. The budget which we gave Bill Smith was based on expenditures made by workers in the $1600 income class according to a survey made by the United States Government.

An Orchid

Dear Sir:

Of two or three well-known magazines *American Machinist* is certainly the "most" magazine for the subscription price. I believe its scope in the field of general industry, personalities and things of general interest lend it appeal to the readers. The abandonment of such departments as "Talking Shop" and "Round Table" at first disappoints one. Substitution of new articles is a progressive change which tends to hold the reader's interest.

Your department "New Books" is always of interest but should be enlarged, perhaps to include books not so new, but just as pertinent to the machinist and the engineer. Furthermore, your inclusion of non-technical general interest books is to be praised.

Sincerely yours,

Al E. Hartmann

American Machinist thanks Reader Hartmann for his praise and constructive comments. The editors always welcome any suggestions as to departments or any other part of American Machinist's contents.

Reasons for LONG LIFE and FAST OPERATION of SUPER-SERVICE UPRIGHTS 21", 24" and 28" Sizes.

Longer life from—direct connected driving motor . . . positive type feed clutch . . . automatic oiling . . . ball and roller bearing construction . . . use of heat treated alloy steel gearing . . . multiple splined shafts with integral keys and . . . complete enclosure of all mechanism.

Faster operation from—table arm controls at front of machine . . . automatic depth gauge . . . radial drill type of spindle control and feed engagement . . . direct reading speed and feed plates and . . . convenient levers for instant engagement of feed and speed.

Bulletin U-22 describes these modern all-geared drills. It's yours for the asking.

THE CINCINNATI BICKFORD TOOL CO.
OAKLEY CINCINNATI OHIO U.S.A.

PATENTS

Printed copies of patents are furnished by the Patent Office at 10 cents each. Address the Commissioner of Patents, Washington, D. C.

November 8, 1938

Metal-Working Machinery

Cylinder Boring Machine. Robert L. Hubbard, Pittsburgh, Pa., assigned to William K. Stamets, Pittsburgh, Pa. Patent 2,135,508.

Lathe With Horizontal Faceplate. Anton Holtmeier, Dusseldorf-Hilden, Germany. Patent 2,135,640.

Disk Rolling Apparatus. Axel B. Pearson, Munhall, Pa. Patent 2,135,643.

Pull Broaching Machine. Richard A. Thompson, Detroit, Mich., assigned to Colonial Broach Co., Detroit, Mich. Patent 2,135,861.

Machine for Forming Spiral Bevel Gear Cutters. Ernest C. Head, Detroit, Mich.,

assigned to Goddard & Goddard Co., Detroit, Mich. Patent 2,135,894.

Machine for the Electric Welding of Tubes. David Sciaky, Paris, France. Patent 2,136,059.

Apparatus for Synchronizing Strip Feeding and Fabricating Movements. Edward H. Hall, Chicago, Ill. Patent 2,136,210.

Triple-Action Drawing Press. Walter Ernst, Mount Gilead, Ohio, assigned to the Hydraulic Press Mfg. Co., Mt. Gilead, Ohio. Patent 2,136,240.

Teeth Generating Machine. Ernst Reinecker, Chemnitz, Germany, assigned to J. E. Reinecker, Aktien-Gesellschaft, Chemnitz, Saxony, Germany. Patent 2,136,266.

Method and Means for Producing Gears. Ernest Wildhaber, Irondequoit, N. Y., assigned to Gleason Works, Rochester, N. Y. Patent 2,136,269.

Parts and Mechanisms

Saw Guide. Robert S. Baker, Detroit, Mich. Patent 2,135,488.

Centrifugal Abrading Device. Alfred V. Hollingsworth, Indianapolis, Ind., assigned to the American Foundry Equipment Co., Mishawaka, Ind. Patent 2,135,510.

Setscrew. Harald F. Gade, Philadelphia, Pa., assigned to Standard Pressed Steel Co., Jenkintown, Pa. Patent 2,135,637.

Turret Centering and Locking Mechanism. William R. Gorham, Shibuya-ku, Tokyo, Japan. Patent 2,135,639.

Packing Device for Rotary Elements. Ernst Malcus Agren, Stockholm, Sweden, assigned to Pulvis Aktiengesellschaft Glarus, Switzerland. Patent 2,135,654.

Punch Press Tool Holder. Lars Gulfelt, Redford, Mich. Patent 2,136,190.

Processes

Method and Apparatus for Cleaning by Abrasive Action. John Donald Alexander, Cleveland, Ohio, assigned to American Foundry Equipment Co., Mishawaka, Ind., Patent 2,135,550.

Method of Making Flexible Tubing. Hartwell W. Webb, Flint, Mich., assigned to General Motors Corp., Detroit, Mich. Patent 2,135,651.

Process for Metal Coating. Marshall G. Whitfield and Victor Sheshunoff, Knoxville, Tenn., assigned to Reynolds Metals Co., New York, N. Y. Patent 2,135,652.

Method of Producing Metal Grilles. William B. Pierce, Detroit, Mich., assigned to Aluminum Co. of America, Pittsburgh, Pa. Patent 2,135,766.

Method of and Means for Molding Plastic Materials Which Do Not Flow Easily. Victor Dumert, Finchley, London, England, assigned to Johnson Laboratories, Inc., Chicago, Ill. Patent 2,135,803.

Method of Making Tubs. Clarence James Rodman, Alliance, Ohio, assigned to the Steel Sanitary Co., Alliance, Ohio. Patent 2,135,877.

Tool Forging Method. Paul H. Nast, Claremont, N. H., assigned to Sullivan Machinery Co., Michigan City, Ind. Patent 2,136,083.

Tools and Accessories

Work Fixture. Donald R. Hall, Beloit, Wis., assigned to Gardner Machine Co., South Beloit, Ill. Patent 2,135,505.

Die Stock. Karl A. Kuhn, Greenfield, Mass., assigned to Greenfield Tap & Die Corp., Greenfield, Mass. Patent 2,135,671.

Soldering Iron. Melvin R. Oleson, Visalia, Calif. Patent 2,135,764.

Adjustable Chamfering Tool and Holder. Paul T. Klix, Syracuse, N. Y., assigned to W. C. Lipe, Inc., Syracuse, N. Y. Patent 2,135,819.

Abrading Reamer. Joseph Disco, Santa Ana, Calif. Patent 2,135,884.

Gear Cutter. Ernest C. Head, Detroit, Mich., assigned to Goddard & Goddard Co., Detroit, Mich. Patent 2,135,893.

Shearing or Cutting Tool. Karl Gustaf Ostberg, Stockholm, Sweden, assigned to Fabriksaktiebolaget Haldataxametern, Halmstad, Sweden. Patent 2,135,911.

Internal Diameter Micrometer. John Rae, Ellwood City, Pa., assigned to National Tube Co., Loraine, Ohio. Patent 2,135,912.

Hone. William Vanlandingham, Des Moines, Iowa. Patent 2,135,926.

Gear Puller. Arthur L. Cornwell, Wellsville, N. Y. Patent 2,136,004.

Tool Holder. Thomas B. Tiefenbacher, Paterson, N. J. Patent 2,136,091.

Lubricating Threading Tool. Victor B. Westfall, Fall Brook, Calif. Patent 2,136,121.

Cylinder Ridge Reamer. Herbert A. Berkman, Chicago, Ill., assigned to Zim Mfg. Co. Patent 2,136,350.

November 15, 1938

Metal-Working Machinery

Die-Casting Apparatus. Salvatore Gattuso, Ozone Park, N. Y., assigned to Toyers of Summit, Inc., Summit, N. J. Patent 2,136,432.

Metal-Working Machine, Grinder. Elton S. Cornell, East Providence, R. I., assigned to Abrasive Machine Tool Co., East Providence, R. I. Patent 2,136,491.

Surfacing Machine. Homer L. Trimble, Cleveland, Ohio, assigned to Harry C. Trimble, Boston, Mass. Patent 2,136,529.

Wheel-Making Machine. Gustave A. Johnson, Berwyn, Ill., assigned to International Harvester Co., Chicago, Ill. Patent 2,136,619.

Broaching Machine. Frederick S. Floeter, Saginaw, Mich., assigned to Wickes Bros., Saginaw, Mich. Patent 2,136,680.

Apparatus for Welding. John W. Free, Aliquippa, Pa., assigned to Jones & Laughlin Steel Corp., Pittsburgh, Pa. Patent 2,136,772.

Shearing Mechanism and Method. Albert Vuilleumier, Bristol, Conn., assigned to General Motors Corp., Detroit, Mich. Patent 2,136,831.

Forming Press. Arthur H. Long, Chicago, Ill., assigned to Dreis & Krump Mfg. Co., Chicago, Ill. Patent 2,136,856.

Device for Securing Together Articles Such as Plates, Riveter. Jean J. Blanc, Courbevoie, France. Patent 2,136,875.

Apparatus for Coating Metallic Objects with Layers of Other Metals. Tadrusz Sendzmir, Katowice, Poland, assigned to the American Rolling Mill Co., Middletown, Ohio. Patent 2,136,957.

Radial Grinder. John Lewis, Huntington, W. Va. Patent 2,137,140.

Welding Machine. Cleveland H. Quackenbush, Glendale, Calif., assigned to General Electric Co., Schenectady, N. Y. Patent 2,137,181.

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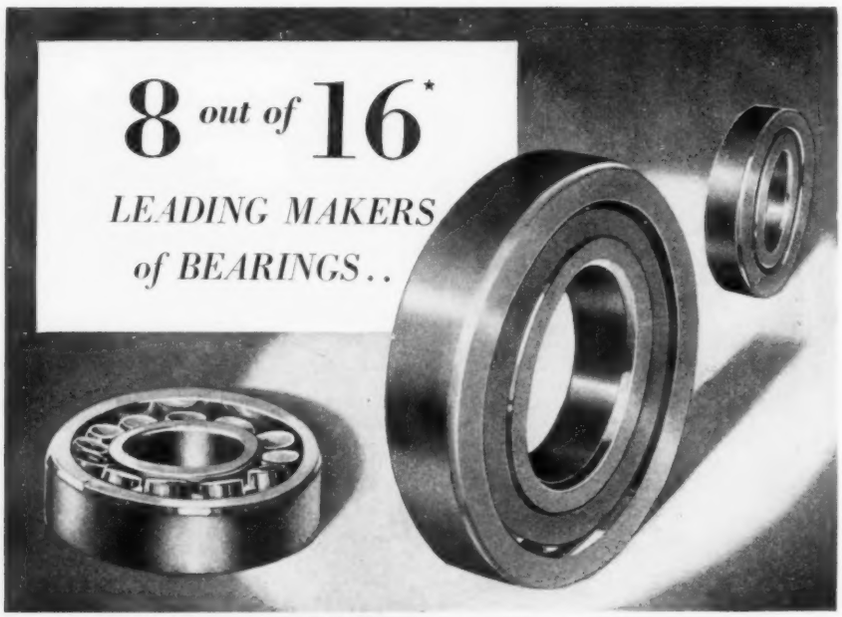

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What Should a Modern 30-In. Lathe Be?

R. G. HEWITT
Huddersfield, England

I can substantiate A. W. Forbes' pertinent remarks on the question "What Should a Modern 30-in. Lathe Be?" (*AM*—Vol. 81, page 1177), particularly regarding lifting arrangements on the lathe. It is not the lifting of the blank or forging onto the lathe that presents the greatest difficulty, but placing the work between centers or in the chuck. This calls for some form of mechanism, either incorporated in the machine or available as an attachment, on which work can be placed. This device should raise the job smoothly to the correct height and locate it between the centers or in the chuck.

The position of the tools on the lathe is almost as intriguing a question as the reason why lathe spindles rotate in a counter-clockwise direction. If the spindle were turned in the opposite direction, the danger to the operator from flying chips would be eliminated; and this is a factor of considerable importance in these days of high cutting speeds. Also, the heaviest stresses then would be imposed in a downward direction on the head stock and there should be a corresponding improvement in finish and reduction of vibrations. While this method is better than having tools positioned nearer the ways, which would hamper chip disposal and complicate the slide operating mechanism, there probably is a snag in it somewhere to explain why, apart from a few isolated instances, no lathes are built for operation in this manner.

The obstruction offered by the lathe carriage always is annoying when trying to get the last ounce of capacity out of the machine. Curtailing a machine's capacity has one good point; it safeguards the gearing and probably lengthens the life of the machine. I know of a lathe which had the carriage chipped and filed to provide clearance for a steel wheel. The machine did the job, eventually, after ruining all of the operator's tools and driving the beltman to despair. Not many weeks later, the gearing in the headstock failed as a direct result of this overload.

Mr. Forbes' point concerning power is interesting. A few years ago it was common over here to see advertisements of lathes taking a cut one inch in depth and giving particulars of the quantity of metal removed per hour. In these days of working to close limits in the foundry and forge shop,

such performances should be regarded as sheer waste. It would be interesting to know the difference in power required to drive a modern lathe using cemented-carbide tools at high surface speeds but with fine feeds, and a comparative lathe of old design using only high-speed steel tools with a slow surface speed but coarser feed.

A Way to Reduce Accidents

J. E. BULLARD

An old employee of one concern had an extremely good record for safety. Never had he been involved in a serious accident. Then, he seemed to become careless all of a sudden. One accident followed another. Though none of them were especially serious, it became more and more obvious that, unless something was done, it was only a matter of time when he would have a disabling if not a fatal accident. As a matter of fact it reached the point where it was a question of discharging him or of curing him.

The manager called him in and had a talk with him. It was a frank and searching talk. It was learned that there had been a great deal of illness in this man's family. Doctor's bills and other special expenses had made it necessary to run into debt. In the end, the man had borrowed money from a small loan company. His expenses were still above normal, and what he earned was not large enough to keep up with the payments. The loan company threatened to attach his wages and he feared he might lose his job. The worry appeared to be the real reason why he was having so many accidents.

He was directed to bring in all the bills he owed. With the manager he worked out a budget, providing for a small amount to be taken each pay day to pay off his debts. The company paid all his debtors and collected from him by deducting the agreed upon amount from his wages. From that time on he did better work and was as free from accidents as ever.

Cracks in R.R. Axles

Failures in locomotive axles have resulted in long and intensive tests by the Timken Roller Bearing Company for the American Association of Railways. These show that the pressing of axles into wheels weakens the axle to an unbelievable degree. The tests show that fatigue cracks develop at such low bending stresses as 10,500 lb. per sq. in.

The development of these fatigue cracks can be greatly retarded by rolling the axles under heavy pressure before mounting. In some tests the rolled axle operated 25 times as long before developing cracks of the same depth as the unrolled axle.

Fill-in Work

Work in most job shops is either feast or famine—either overtime or a game of checkers between jobs. That's why a lot of shops build some of their own machinery instead of buying standard stuff. Finding "fill-in" work to keep the crew together without going broke or missing a payroll is no easy job.

One such shop on the Texas border has developed a "puller" for oil well pipe. It means quite a lot of work from welding the base, or frame of structural shapes to the gin pole, winches, jaw couplings and the like. They don't sell many but enough to take up the slack between jobbing jobs. It's a wise boss who can find the right sort of fill-in work.

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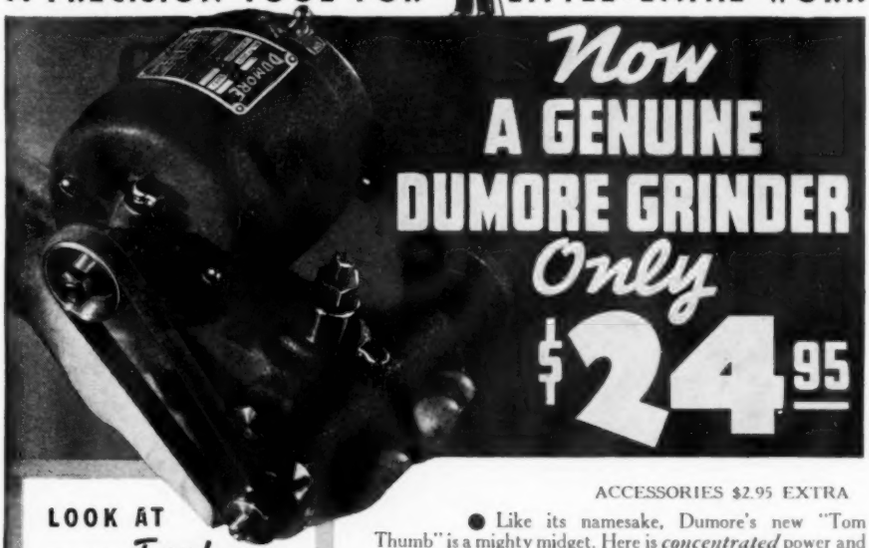

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At only $24.95 . . . the lowest price ever placed on a genuine Dumore Precision Grinder . . . "Tom Thumb" is more grinder for less money than was ever offered you before. If yours is a typical modern shop, you have definite need for a grinder to do small jobs . . . to understudy your larger tools. "Tom Thumb" is the thing. He's priced so low it is false economy to do without him. Ask your Industrial Distributor for a demonstration . . . or write for facts.

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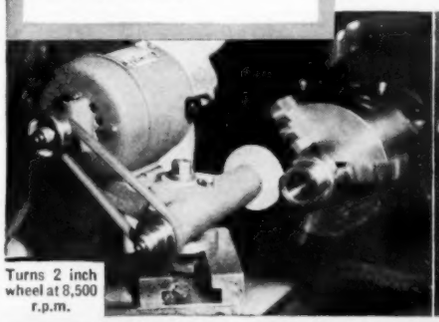
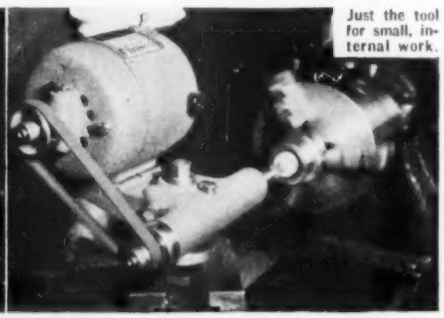

Turns 2 inch wheel at 8,500 r.p.m.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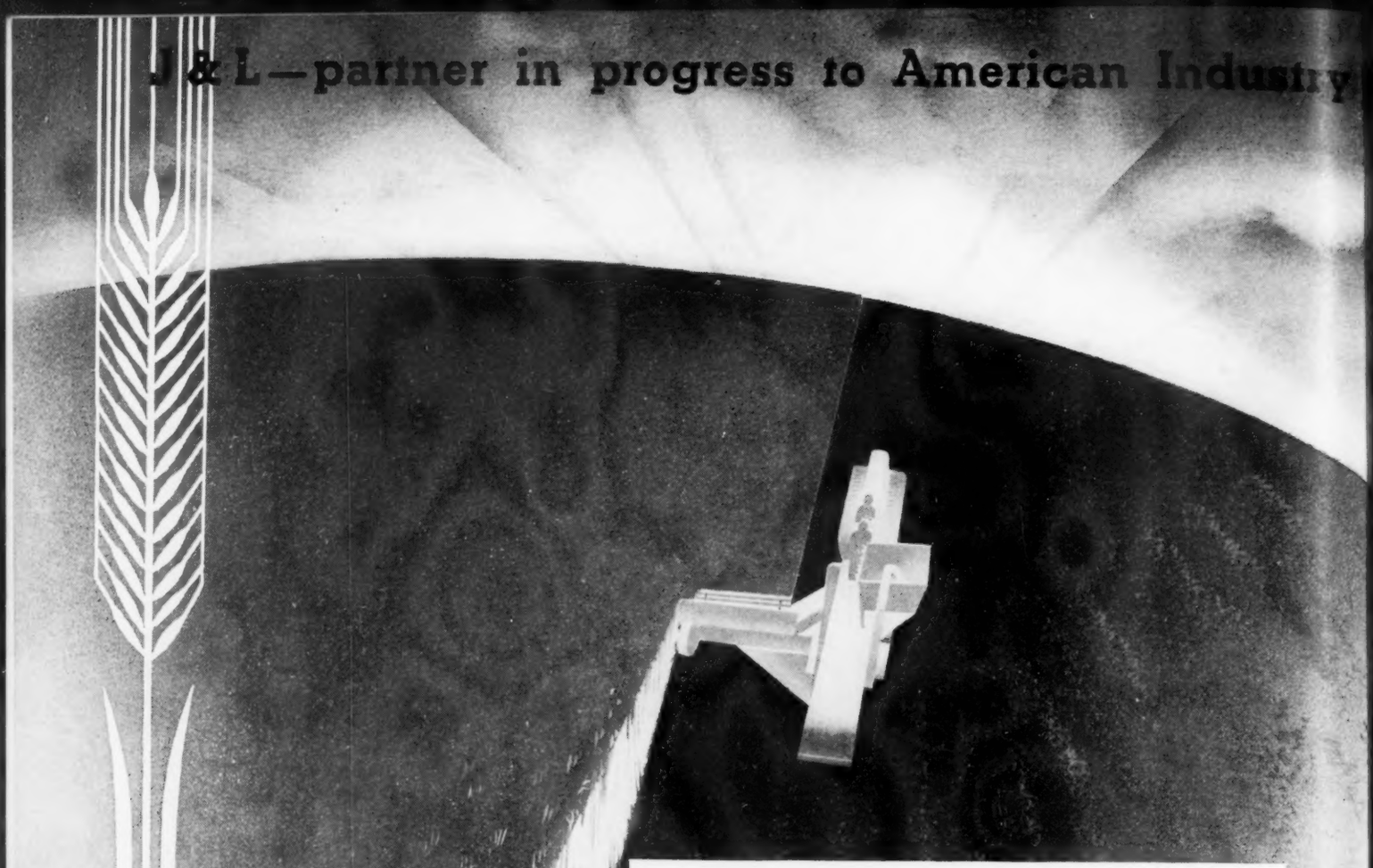

Machines, more and more, will relieve mankind of his burdens — increase his employment — and J & L Cold Finished Steel will help make such machines practicable

The farm implement that reaps the harvest . . . the press that prints your newspaper . . . the machine that washes your clothes . . . the motor that carries you over the highways—these and innumerable other machines are economically produced today because of the inherent qualities in cold finished steel. To cold finished steel we owe the low-cost, high-speed production of gears, pins, shafting, bearings, literally thousands of parts used in our modern machines. Originators of the cold finishing process, J & L is a leader in its development, in its manufacture, and in the expansion of its applications. J & L Cold Finished Steel is serving industry and the public by making possible the economical production of machines of fine precision — machines that more and more will relieve mankind of his burdens — create new employment — that will serve him well at a cost within his reach.

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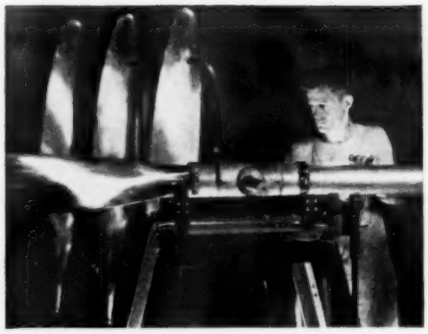
December 14, 1938



Accent on the Air—Propellers must be precise as well as plentiful as aviation passes its adolescence (page 1081)

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Merry Christmas

THESE are the days when memory takes wing, back to the "front room" of childhood, readied for Christmas with red paper bells and garlands, mistletoe on the chandelier, bowls of nuts and sweets, potted poinsettas. Every stick of furniture was polished until it shone. Even the ancestral portraits in their ornate frames were dusted. Mother's best embroidered antimacassars were spread over the sofa. A bowl of artificial flowers held a Spanish shawl draped over the piano.

And in the center of it all was the tree, always so tall that the top and base had to be cropped to get it in at all, covered with tinsel and ornaments, with china angels and popcorn strings, with candy canes and a ruddy-cheeked Santa. And on the mica-and-batting snow beneath were the beribboned presents that "Santa had left".

From the kitchen came the unmistakable odor of turkey and "fixins", of mince meat and dumplings, of at least three kinds of pie. Then the excited moments that brought the tinkle of approaching sleighbells, red-cheeked relatives stamping through the snow, the front hall filled with excited chatter, steaming overshoes and vari-hued mufflers. And, finally, to Christmas dinner. And over all hung an aura of happiness, of friendliness, of kindness and good cheer.

Christmas time and Christmas customs have changed. But the spirit of Christmas lives on. We can still divert our attention from the routine of business and personal affairs to think of something that will add to the happiness and comfort of others. This break in the mingled humdrum and whirl of the year should be a time of real festivity, with glad hearts glowing with good will towards men.

May your Christmas be a happy one, and your New Year a prosperous one. And beneath it all, may there be ever-present the age-old spirit of Christmas, the spirit of Peace on Earth and Good Will Towards Men.

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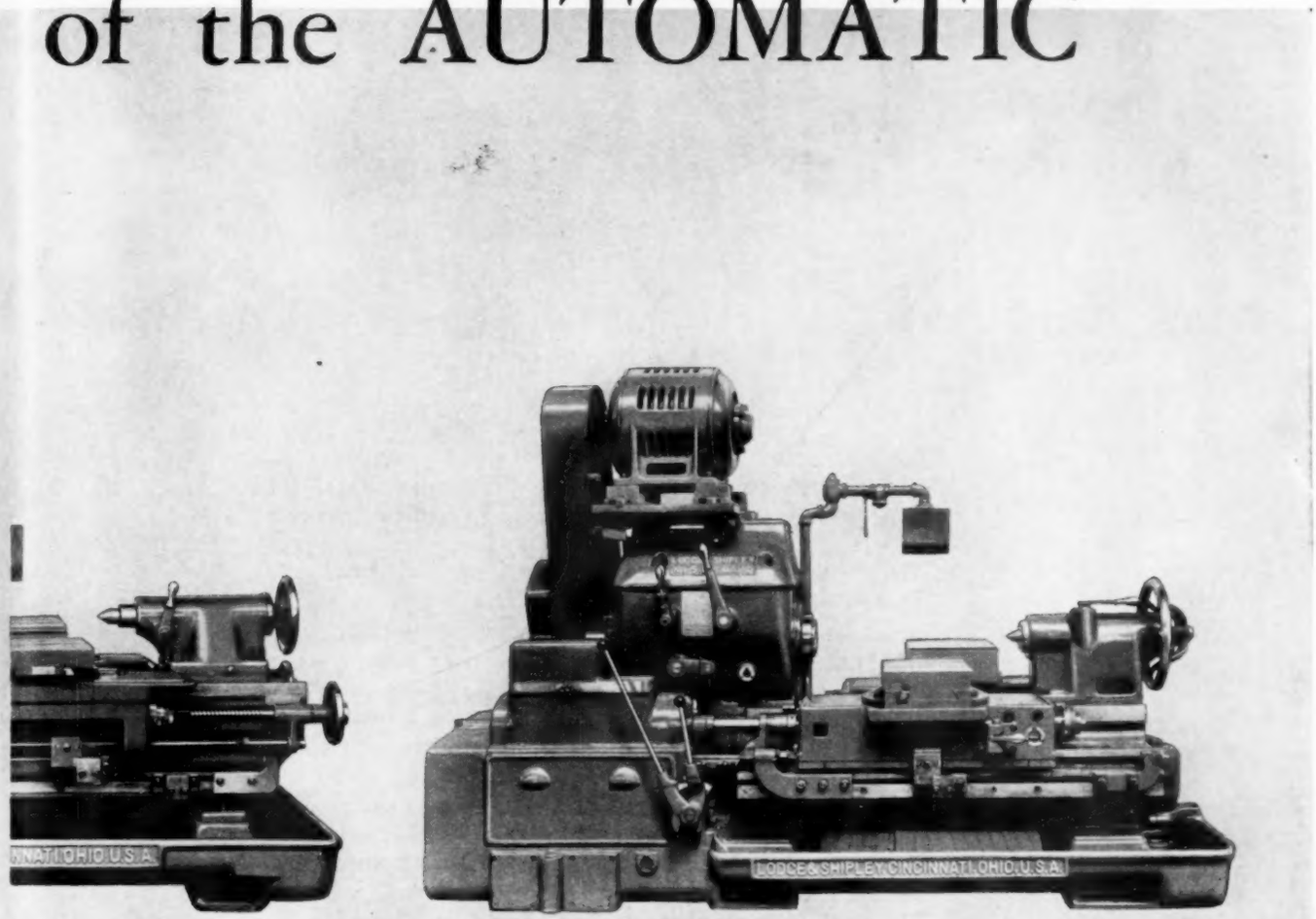
of the AUTOMATIC



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'Twas the night before Christmas...

—when all through the house
Not a creature was stirring,—not even a mouse.
The stockings were hung by the chimney with care,
In hopes that Saint Nicholas soon would be there.

The children were nestled all snug in their beds,
While visions of sugarplums danced in their heads,
And Mamma in her 'kerchief and I in my cap,
Had just settled down for a long winter's nap.

When out on the lawn there arose such a clatter,
I sprang from my bed to see what was the matter.
Away to the window I flew like a flash,
Tore open the shutters and threw up the sash.

The moon on the breast of the new fallen snow,
Gave a lustre of mid-day to objects below,
When what to my wandering eyes should appear,
But a miniature sleigh and eight tiny reindeer;

With a little old driver, so lively and quick,
I knew in a moment it must be St. Nick.
More rapid than eagles his coursers they came,
And he whistled, and shouted, and called them by name:

"Now, Dasher ! now, Dancer ! now, Prancer ! and Vixen !
On Comet ! on Cupid ! on Donder and Blitzen !
To the top of the porch, to the top of the wall !
Now, dash away, dash away, dash away all !"

As dry leaves that before the wild hurricane fly,
When they meet with an obstacle, mount to the sky,
So up to the house-top the coursers they flew
With the sleigh full of toys, and St. Nicholas, too.

And then in a twinkle, I hear on the roof
The prancing and pawing of each little hoof.
As I drew in my head, and was turning around,
Down the chimney St. Nicholas came with a bound.

He was dressed all in fur, from his head to his foot,
And his clothes were all tarnished with ashes and soot;
A bundle of Toys he had flung on his back,
And he looked like a peddler just opening his pack.

His eyes how they twinkled ! his dimples how merry !
His cheeks were like roses, his nose like a cherry.
His droll little mouth was drawn up like a bow,
And the beard on his chin was as white as the snow.

The stump of a pipe he held tight in his teeth
And the smoke, it encircled his head like a wreath.
He had a broad face and a little round belly
That shook when he laughed like a bowl full of jelly !

He was chubby and plump, a right jolly old elf,
And I laughed when I saw him, in spite of myself.
A wink of his eye, and a twist of his head,
Soon gave me to know I had nothing to dread.

He spoke not a word, but went straight to his work,
And filled all the stockings, then turned with a jerk,
And laying his finger aside of his nose,
And giving a nod, up the chimney he rose.

He sprang to his sleigh, to his team gave a whistle,
And away they all flew like the down on a thistle.
But I heard him exclaim ere he drove out of sight,
"Happy Christmas to all and to all A Good Night."

A Visit from
St. Nicholas
Clement Clarke Moore
1779 - 1863

BEYOND THE SHADOW OF A DOUBT . . . . . .

IMPROPER inspection can lose the profits made by up-to-date machinery. These profit leaks may be stopped easily by the use of J & L Pedestal Comparators. Leading tool and gage manufacturers, as well as automobile, machinery, electrical, instrument, glass, closure and steel manufacturers have accepted the Comparator as the most universal, modern and practical optical inspection machine offered to the trade today. This machine will tell, at a glance, if the parts are within your tolerances—it is your assurance, *beyond the shadow of a doubt,* that parts will assemble properly.

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